VARI*LITE®
The Automated Lighting Company

MEMORANDUM

Product Development Department

TO: All recipients of the **VL5** Luminaire Service Manual

CC:

RE: New Documentation

FROM: Technical Publications

DATE: March 4, 1997

This service manual supersedes all existing **VL5, VL5Arc,** and **VL5B** luminaire documentation. This includes the VL5 Luminaire Installation, Operation, and Test Manual (02.9634.0001), VL5 Illustrated Parts Breakdown Manual (02.9634.0003), and VL5/VLSR Maintenance Procedures Manual (02.9634.0002). These documents may also be contained in the Series 300 System Notebook (02.9634.0000). These documents should be discarded in their entirety.

In addition, the Series 300 Technical Bulletins manual should be updated to discard the following Technical Bulletins. You may want to retain versions of these technical bulletins in the shop copies of this manual.:

VL5-001 thru VL5-006
VL5-008 thru VL5-018
VL5-020
VL5-023 thru VL5-028

VL5™ Wash Luminaire
VL5Arc™ Wash Luminaire
VL5B™ Wash Luminaire

Service Manual

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Foreword

This technical manual is confidential property of Vari-Lite, Inc. All information contained herein is the sole and exclusive property of Vari-Lite, Inc and may not be used, disclosed, or reproduced in any manner without the prior written consent of Vari-Lite, Inc.

This manual supersedes all existing **VL5** luminaire information and procedures. The following Vari-Lite technical publications are superseded by this service manual and should be discarded.

02.9634.0001 **VL5** Luminaire Installation, Operation, and Test

02.9634.0002 **VL5** Illustrated Parts Breakdown

02.9634.0003 **VL5/VLSR** Maintenance Procedures

These documents may also be contained in the **Series 300** System Notebook (02.9634.0000).

This manual incorporates distinct type styles to differentiate between certain types of text. These styles are defined as follows:

Boldface	Trademarked or registered product.	Example: **Artisan**® control console
Italics	Words with specialized meanings such as luminaire attributes.	Example: Luminaire *intensity*
Bold Italics	Highlighting trademarked products within titles.	Example: ***Artisan* Control Console**
Ariel Font	Macintosh computer screen commands.	Example: Click on SAVE.
ALL CAPS	Board Control menu option.	Example: Select RESET.
[brackets]	Console button name.	Example: Press [STRT] button.

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RE: Comments to ***VL5/VL5Arc/VL5B*** **Luminaire Service Manual (02.9634.0010)**

FROM:

DATE:

PAGE 1 OF 1

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Comments:

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Chapter 1. Introduction

This chapter contains the following sections:

1.1 General Information

1.2 Equipment Description

1.3 Location of Major Luminaire Components

1.4 Principles of Operation

1.5 Beam Charts

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1.1 General Information

1.1.1 About This Manual

This manual describes specific information regarding description and installation of the **VL5**™, **VL5Arc**™ and **VL5B**™ wash luminaires. It provides test, fault isolation, and repair procedures for the purpose of general service and repair of the luminaires. The manual is intended for use by Vari-Lite personnel and by Vari-Lite's customers/clients. The following equipment items are covered in this manual:

Equipment Description	Part Number
VL5™ Wash Luminaire	20-9634-0001
VL5Arc™ Wash Luminaire	20-9647-0001
VL5B™ Wash Luminaire	20-9634-0201

1.1.2 Documentation

1.1.2.1 Technical Manuals

Procedures for operating and maintaining a **Series 200**™ or **Series 300**™ system are contained in **Series 200** System Manual (02-3004-0200) and various equipment manuals. Programming procedures are contained in the Operator Programming Manuals, which are kept with the console. There are currently two programming manuals: 02-3004-0010 (**Artisan** and **mini-Artisan** control consoles) and 02-3004-0210 (**Artisan Plus**, **mini-Artisan Plus**, and **mini-Artisan2**).

All of the ACS equipment are contained in the ACS Equipment Service Manual (02-9623-0200). Each luminaire and console has its own service manual. Both types of **Artisan** consoles are covered in the **Artisan** Control Console Service Manual (02-9622-00101). The three **mini-Artisan** consoles are contained in separate service manuals.

Procedures for inspecting and preparing equipment for shipment are found in the **Series 200** System Equipment Preparation and Inspection Procedures (02-3004-0042).

1.1.2.2 Technical Bulletins

Technical bulletins are issued from the Dallas, Texas USA office. They are updates to documentation that discuss changes to the equipment, software, and the latest available information concerning **VARI*LITE** equipment. Technical bulletins are categorized by assembly or subassembly, and identified by a number such as ART-075 (**Artisan** Technical Bulletin number 75).

1.1.3 Maintenance Philosophy

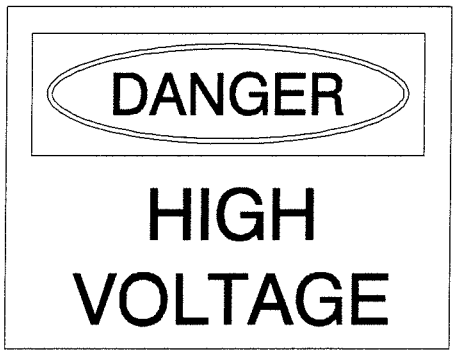
The fault isolation and maintenance sections of this manual provide a logical path of fault isolation and repair designed to return the equipment to proper operation in most cases. The fault isolation procedures for the equipment end item have been broken into two sections, which lead the technician to maintenance procedures that he/she can reasonably be expected to perform.

The criteria for separating fault isolation and maintenance procedures into two sections can be defined by Class 2 and Class 3 repairs. Class 2 repairs only require the technician to replace an end item subassembly or easily accessible component (e.g., a fuse) in order to return the equipment to proper operation. Class 2 repairs are applicable to situations in which tools and/or experience of the technician are limited, or time does not permit extensive maintenance. Class 3 repairs (identified as *Shop Only*) involve in-depth repair to subassemblies that have been identified as faulty. Class 3 repairs are applicable to situations in which tools and experience of the technician allow for more extensive procedures. In some cases, even though a technician may have the ability and resources to perform extensive repair, he/she may decide to replace the entire subassembly in order to return the equipment to proper operation more quickly. The subassembly could then be repaired at a more appropriate time.

It is extremely important to note that while many of the commonly identified solutions to equipment failure are provided in this manual, it does not cover all possible situations. Contact the appropriate Vari-Lite Support Group if you have questions or if the procedures given do not solve the problem.

1.1.4 Recommended Safety Practices

This section describes the various types of safety factors to be considered while installing and operating **VL5** luminaires.



Equipment High Voltage

All components of the **Series 200** and **300** systems use high voltage to operate. These voltages can produce death on contact. When working around or within powered components and cables, extreme caution must be used. When conditions permit, maintenance should be performed with power off.

Luminaire Hanging

Safety is the prime consideration when hanging luminaires. Safety far outweighs any concern about operator convenience, speed of load-in or load-out, or ease of changing-out luminaires when the truss is in the air. The first consideration must be whether the truss or pipe can safely support the weight of the luminaires and repeaters. The second consideration must be whether the luminaires are securely attached so they cannot possibly come off the truss or pipe (even if the truss goes 90° from horizontal due to a failure of the chain motor or fly system). In addition to mounting hooks, all truss-mounted equipment are provided with a safety cable to prevent the equipment from falling off the truss. The safety cable is connected to the equipment's base, looped around the truss, and then reattached to the equipment base. The cable should be wound tightly, leaving as little slack as possible.

Lamp Handling

Due to the use of high power lamps (bulbs) in all **VL5** luminaires, the heat sink at the back of the luminaire can reach temperatures of around 400°F when the lamp is lit. To reduce the chance of burns, wait 10 minutes after dousing lamp before handling any **VL5** luminaire.

When handling a lamp, use the ceramic base to hold the lamp. Do not touch the glass part of the lamp. If you touch the glass part with your fingers, wipe off the fingerprints with alcohol. The fingerprints will show on the glass surface.

When operating **VL5Arc** arc lamps, allow luminaires to operate for at least 3 minutes. It takes about 3 minutes for the fill components (mercury and halogen-metal compounds) in the lamp tubes of HTI 250 and HTI 400 lamps to vaporize completely. If the lamps are switched off earlier than 3 minutes, the fill components are partially vaporized. The inadequately vaporized fill components and the electrode material (tungsten) are deposited in the areas of the lamp tubes that have remained cool. As a result, the lamp tubes blacken prematurely and reduce the service lives of the lamps.

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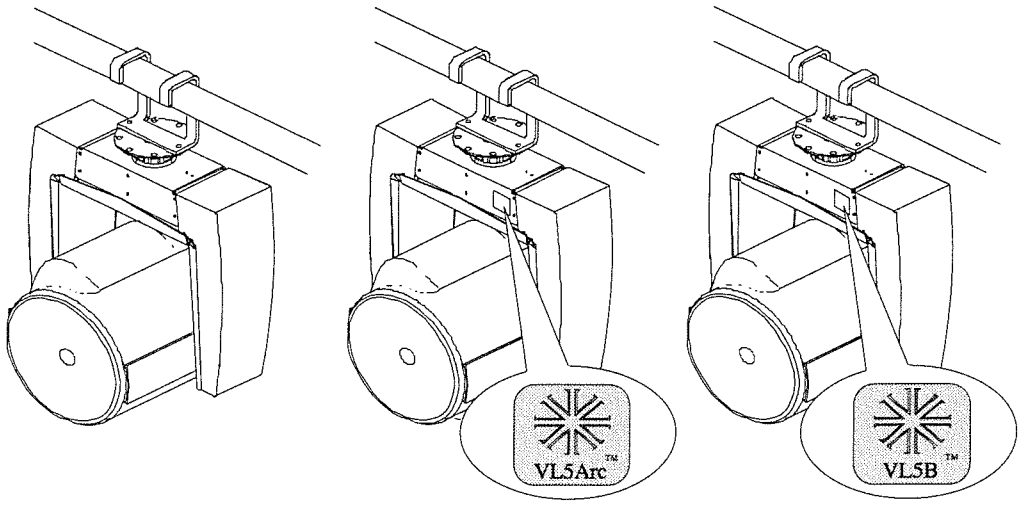
1.2 Equipment Description

1.2.1 Standard Features

The **VL5**, **VL5Arc**, and **VL5B** luminaires are silent, fully-automated luminaires equipped with a high wattage lamp, which is coupled with a cold-mirror reflector to remove the excess heat from the beam. A radial color changer containing three color changers holding 16 frames of enhanced dichroic media produces smooth color crossfades throughout the color range. A radial diffuser or douser mechanism containing 16 panels and an interchangeable front lens provides a wide range of beam control options. The front nose ring and rear housing are hinged and latched to provide ease of access to the lamp and lens for replacement.

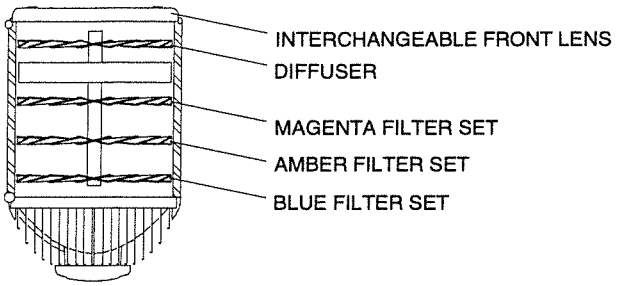
The **VL5**, **VL5Arc**, and **VL5B** luminaires can be controlled by **VARI*LITE Series 200** system consoles or DMX-512 controllers. They are used in conjunction with a **Smart Repeater**™ processing unit, which combines electrical power and data signals from different sources and provides it to the luminaire. DMX-512 signals can be routed directly through the unit using five-pin XLR connectors. The **Smart Repeater** thumbwheel switch sets the addresses of up to six luminaire ports for use with the **Series 200** system, and controls the starting address for DMX-512 control of the luminaires.

The luminaire's compact, durable design allows for ease of storage and installation. The light-weight luminaire hangs on 18 inch centers.



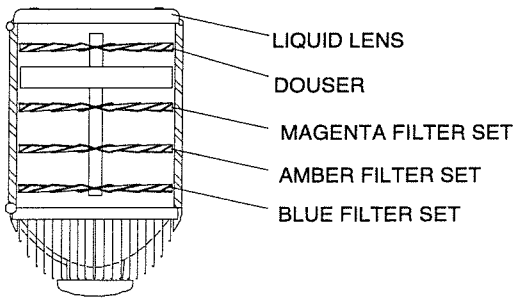
1.2.2 *VL5* Wash Luminaire

The standard **VL5** luminaire utilizes an incandescent lamp powered by an external dimmer. It utilizes three standard dichroic color filter sets arranged in the following order: *blue*, *amber*, and *magenta*. A radial diffuser consisting of filters similar to the color filters is installed at the front end of the head enclosure. A choice of six interchangeable lens styles customize beam output. This version of the luminaire can accommodate both 1000 watt and 1200 watt lamps dimmed by a conventional dimmer rack or a **C3** power supply module, which is used in conjunction with the modular rack. In addition, an optional tophat/gelframe can be installed in front of the lens to further customize the output.



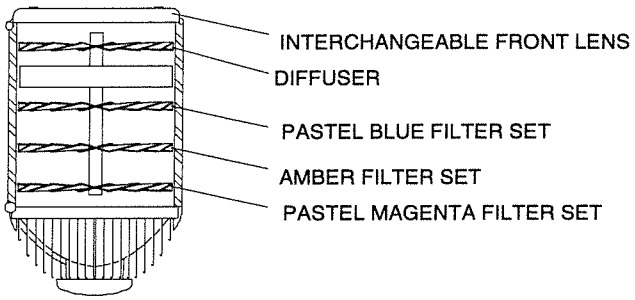
1.2.3 *VL5Arc* Wash Luminaire

The **VL5Arc** luminaire offers several features that differ from the standard **VL5** luminaire. The **VL5Arc** luminaire utilizes a 575 watt arc lamp powered by an **APS6**™ module, which is used in conjunction with the modular rack. A radial douser replaces the standard diffuser at the front end of the head enclosure to provide mechanical dimming. Like the standard version, the luminaire utilizes three standard dichroic color filter sets arranged in the following order: *blue*, *amber*, and *magenta*. The most dynamic feature is the liquid lens, which can increase beam size as a special fluid is pumped into a flexible honeycombed pocket attached to a clear lens. A motor driven bellows controls the amount of fluid. This luminaire also supports the optional tophat/gelframe assembly.



1.2.4 *VL5B* Wash Luminaire

The **VL5B** luminaire is a pastel version of the standard **VL5** luminaire. The **VL5B** luminaire utilizes an incandescent lamp powered by a conventional dimmer rack or a **C3** power supply module just as the standard version. It utilizes one standard and two pastel dichroic color filter sets arranged in the following order: *magenta*, *amber*, and *blue*. A radial diffuser consisting of filters similar to the color filter is installed at the front end of the head enclosure. A choice of six interchangeable lens styles customize beam output. This version also supports the optional tophat/gelframe.



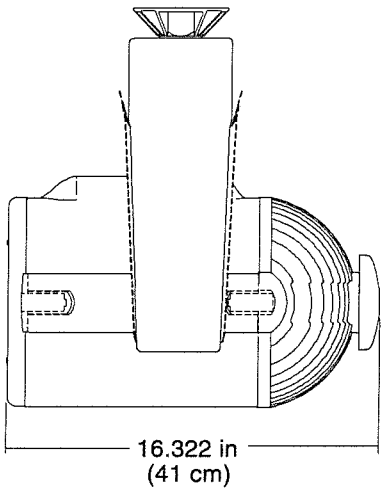
1.2.5 Dimensions and Weight

The **VL5** luminaire head length is 16.322 inches (41 cm). The total height measured from pan tube to front nose ring is 21.576 inches (55 cm). The luminaire yoke width is 15.644 inches (40 cm).

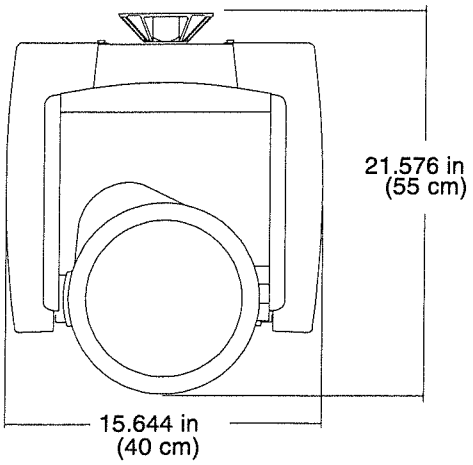
The **VL5** luminaire weight is 25 pounds (11 kg).

Note: Refer to **Figure 2-1** for luminaire clearance and truss hook hanging dimensions.

SIDE VIEW



FRONT VIEW



1.2.6 Technical Specifications

Physical Features

Light Source (**VL5/VL5B**)

Phillips 1000W tungsten halogen lamp with compact bi-plane filament and GX9.5 base; use only VL part no.

- 71-2526-0100 at 100V (Asia)
- 71-2526-0120 at 120V (US)
- 71-2526-0230 at 230V (Europe)

Phillips 1200W tungsten halogen lamp with compact bi-plane filament and GX9.5 base; use only VL part no.

- 71-2529-0120 at 120V Blue Pinch (US)

Light Source (**VL5Arc**)

Phillips 575W arc lamp MSR75HR; use only VL part no.

- 71-2528-0575

Reflector

Eight-inch, parabolic, glass, dichroic cold-mirror.

Color Temperature

3200°K (at rated lamp voltage).

Light Output

1000 foot-candles at 20 feet (center beam intensity with clear lens and diffuser out) in white.

Control Processor

Motorola 68332 operating at 16.7 MHz w/ 256kB RAM & 128kB ROM.

Power Requirements

Light source powered by external dimmer; motors and electronics powered by **Smart Repeater** processing unit.

Light Source Power

1000 watts (1kW) or 1200 watts (1.2kW) - **VL5/VL5B**
575 watts - **VL5Arc**

DC Input Power

+24 Vdc at 3 A (72 W).

Operating Temperature

0 to 130°F (-18 to +54°C)

1.2.7 Programmable Functions

Intensity

An external dimmer provides lamp power to the luminaire. It is connected by six-circuit multi-core cable through a **Smart Repeater** unit. An analog dimmer may be used and controlled by the **Series 200** system through a **VLD**® dimmer interface. A DMX controlled dimmer may be used and operated by the **Series 300** system through a **UDM** interface. The luminaire may also be dimmed by the **C3** power supply module, which is installed in the modular rack SixPack chassis.

Color

Dichro-Tune™ patented cross-fadable radial dichroic color changer with independent control of *Blue*, *Magenta* and *Amber* color filters.

Color change is 0.7 second min.

Focus (Pan & Tilt)

Digital servo system with 320:1 speed range.

Velocity	220 degrees per second max. 0.75 degrees per second min.
Accuracy	0.3 degrees resolution
Pan	360° in 1.7 seconds min.
Tilt	270° in 1.2 seconds min.

Beam

VL5/VL5B: Beam size and shape variable by manually interchangeable glass front lens cooperating with internal diffusing mechanism. Beam edge variable by pivoting textured-glass diffuser panels; from sharp to soft in 0.7 sec.

VL5Arc: Beam size variable by liquid lens. Amount of fluid controls variation.

Timing

Luminaire responds to **Series 200** system timing controls.

1.3 Location of Major Luminaire Components

The following section identifies the major components and subassemblies for all three types of **VL5** luminaires.

1.3.1 Exterior Components

Figure 1-1 Ref. No.	Name	Description
1	Double truss hook	Removable truss hook. Used for luminaire hanging installations. An optional floor mount stand can be substituted.
2	Safety cable	Reinforced tether with clips for hanging safety.
3	Pan tube	Provides pan axis for motor driven pan.
4	Yoke leg cover	Protects interior yoke components. Clips into place.
5	Board-side yoke leg	Houses **VL5** Lamp Control PCB.
6	Head assembly	Houses the lamp, reflector, color filters, diffuser, and lens.
7	Yoke cross member	Houses pan mechanism. In **VL5Arc** luminaire, cross member also houses ignitor board.
8	Tilt-side yoke leg	Houses tilt mechanism.
9	Head cover	Removable cover allows access to head components. (2 each)
10	Front lens	Interchangeable glass lens. (For **VL5Arc** luminaire, a clear glass lens also contains a flexible liquid lens.)

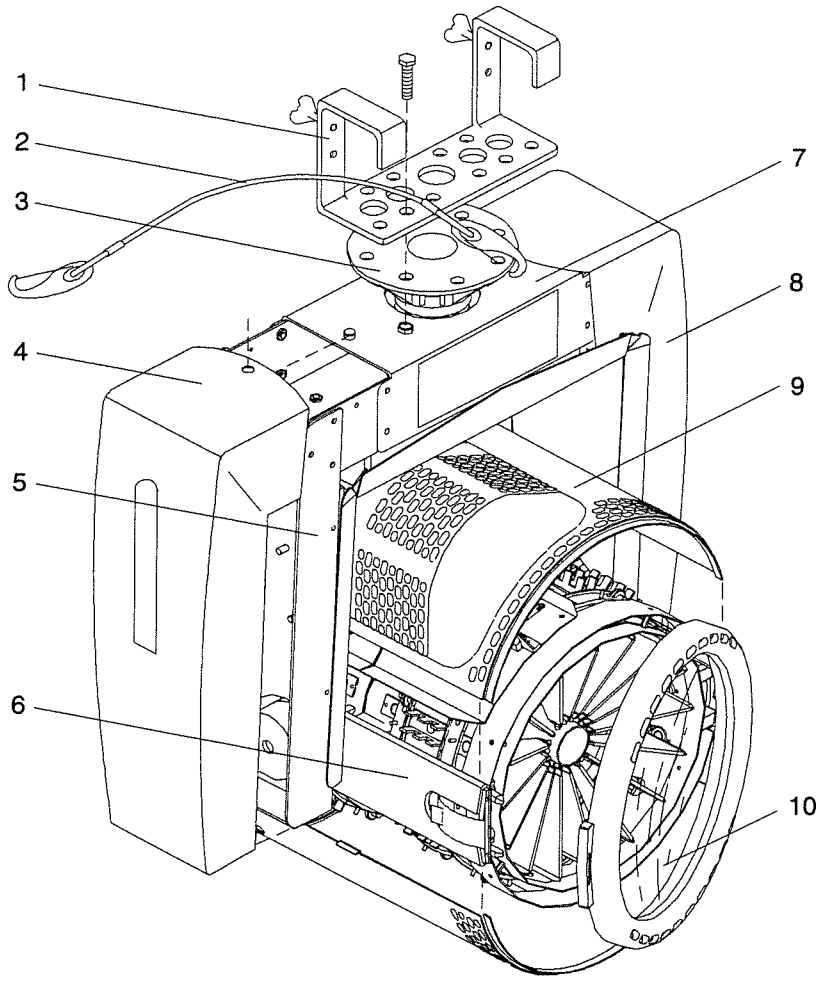


Figure 1-1. Location of VL5/VL5Arc/VL5B Exterior Components

1.3.2 Head Components

Figure 1-2 Ref. No.	Name	Description
1	Nose ring	Hinged front ring assembly. Contains the luminaire's interchangeable front lens. Swings open for lens replacement.
2	Hinged rail assembly	One of two rail assemblies. Contains the nose ring and heat sink assemblies, which cover the front and rear ends of the luminaire head. Supports one tilt tube.
3	Tilt tube	One of two tilt tubes that provide a tilt axis and hold the head between the yoke legs.
4	Reflector	Cold-mirror reflector. Removes excess heat from the beam
5	Lamp	Phillips tungsten halogen lamp. Incandescent or arc.
6	Blue/Amber Bulkhead (**VL5/VL5Arc**), *or* Magenta/Amber Bulkhead (**VL5B**)	Contains the blue and amber filter panels, drive rings, and actuator motors which correspond with the blue and amber color shades. (The blue filters are replaced by pastel magenta filters in the **VL5B** luminaire)
7	Heat sink	Hinged rear assembly. Contains the reflector and lamp. Swings open for lamp replacement.
8	Linear actuator motor assembly	One of two motor assemblies containing two linear actuator motors each. Rotates the drive rings, which open and close the filter panels to allow color changes, cross-fades, or diffusion.
9	Diffuser panel	One of 16 radial diffuser panels, which are used to vary the beam shape and size.
10	Magenta/Diffuser Bulkhead (**VL5/VL5Arc**), or Blue/Diffuser Bulkhead (**VL5B**)	Contains the magenta and diffuser panels, drive rings, and actuator motors which correspond with the magenta color shades and diffusing capabilities. (The magenta filter are replaced by pastel blue filters in the **VL5B** version of the luminaire.)
11	Latched rail assembly	One of two rail assemblies. Contains the latches which hold the nose ring and heat sink in place. Supports one tilt tube.
	Lens/Bellows (**VL5Arc**)	Not shown.

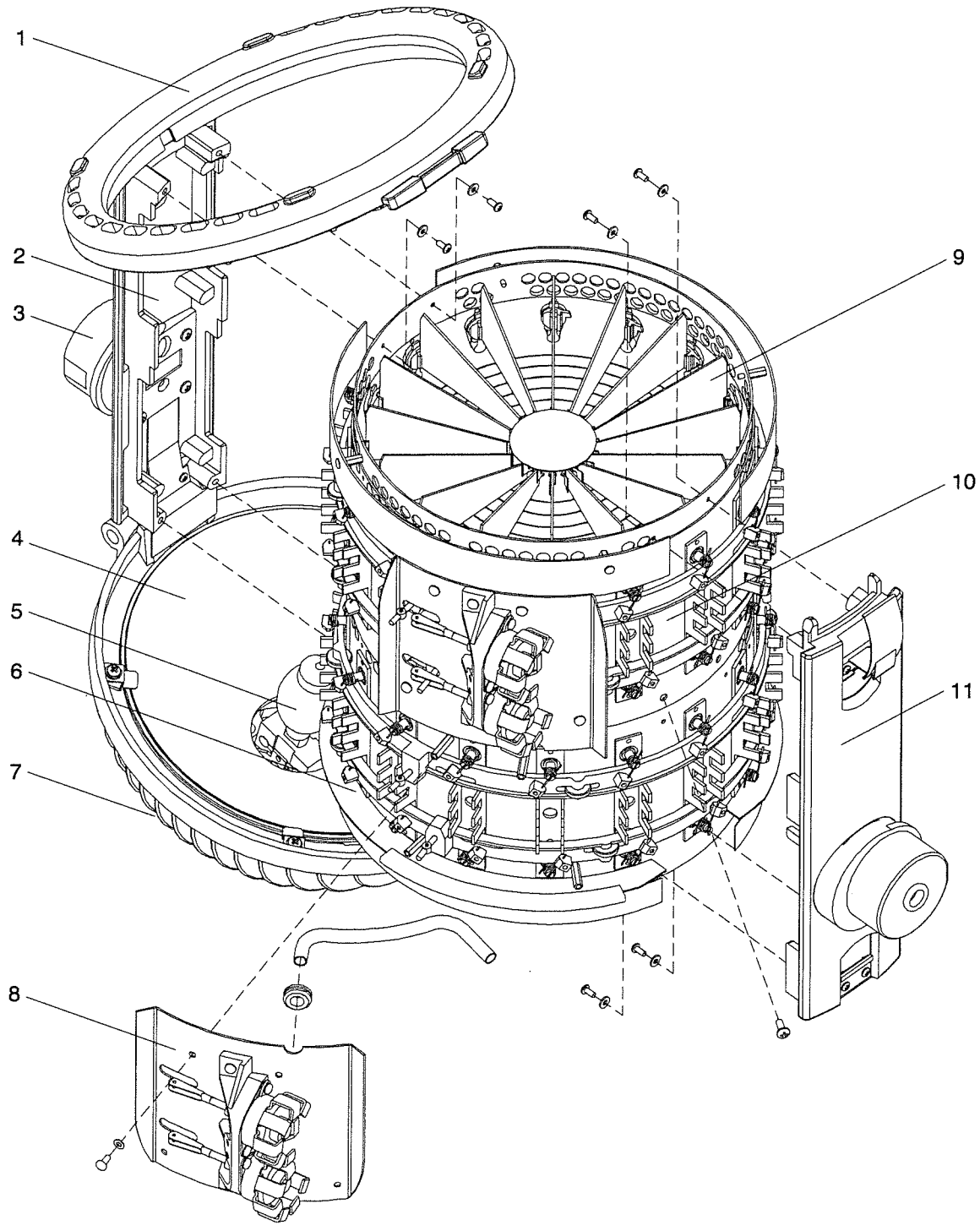
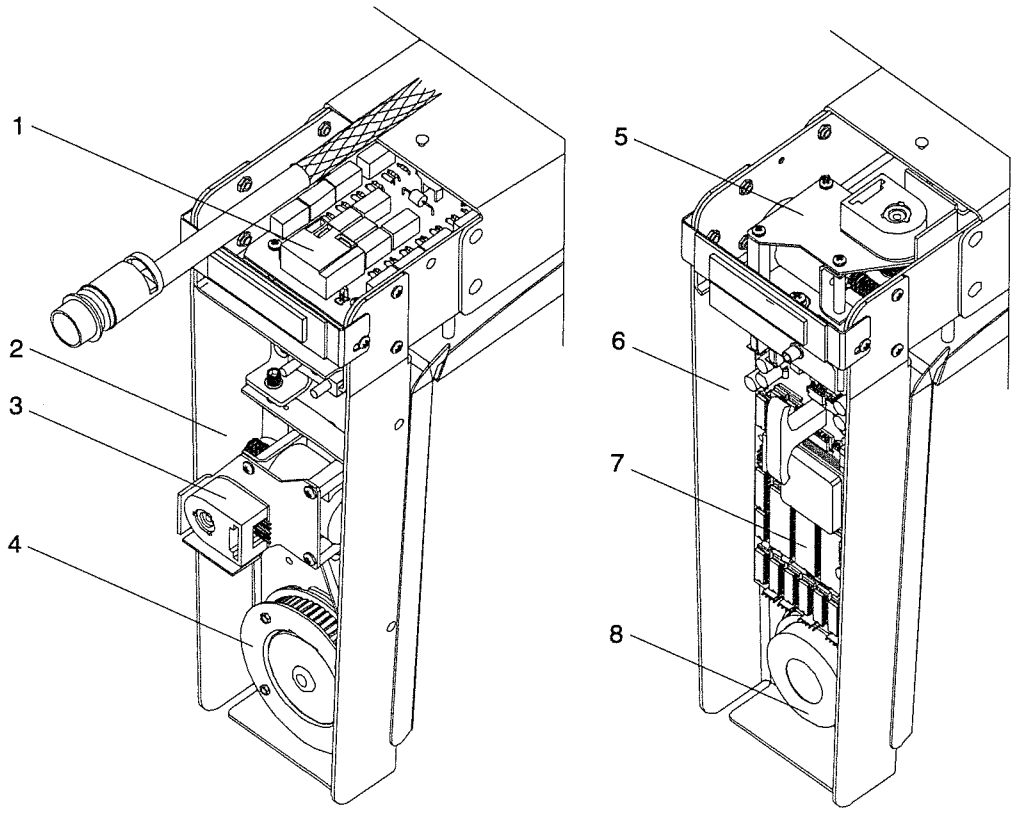


Figure 1-2. Location of *VL5/VL5Arc/VL5B* Head Components

1.3.3 Yoke Components

No.	Name	Description
1	Ignitor board (**VL5Arc** only)	Starts lamp.
2	Tilt-side yoke leg	Yoke leg housing tilt mechanism.
3	Tilt mechanism	Maxon motor, clutch, and encoder assembly, which drives the luminaire tilt axis tube by a belt.
4	Driven pulley	Pulley attached to the tilt axis tube, driven by the tilt mechanism belt.
5	Pan mechanism	Maxon motor, clutch, and encoder assembly, which drives the luminaire pan axis by a belt.
6	Board-side yoke leg	Yoke leg housing **VL5** Lamp Control PCB.
7	**VL5** Lamp Control PCB	PCB containing EPROMs and on-board RAM to control the luminaire functions.
8	Tilt tube cap	Controls noise caused by tilt tube rotation.



1.4 Principles of Operation

1.4.1 Operation Overview

Operation of the luminaire is provided by software run within the **Smart Repeater** unit and the luminaire. The processing functions are carried out on the luminaire's lamp control PCB (LCB) assembly. Voltage and data are channeled through the **Smart Repeater** unit to the following luminaire main mechanical subassemblies:

- Blue/Amber Bulkhead Assembly
- Magenta/Diffuser Bulkhead Assembly
- Pan and Tilt Mechanisms (PTM).

VL5/VL5B Lamp Control PCB

The LCB, which is mounted inside the board-side yoke leg, controls the various luminaire functions and communicates with the console by way of an isolated, two-way data link (RS485). The LCB contains a 68332 microcontroller running at 16 MHz. 24 volt power is received from the **Smart Repeater** unit and is channeled directly to the motor drivers. It is also channeled to a switching regulator, which reduces it to 5 volts for powering the LCB logic circuits. The LCB has two channels for operation of pan and tilt servers, which use optical encoders with HP quadrature chips. The pan and tilt motors are driven using Pulse Width Modulation (PWM) and contain integrated single H-bridge drivers. Four stepper motor channels, used for driving the filter/diffuser panels, are bi-polar type and contain integrated dual H-bridge drivers. The LCB also contains four sensor inputs and a diagnostic serial port. It utilizes an EPROM device to store instructions for a power-up self-test procedure. If the self-test procedure concludes successfully, the board goes on-line and the LCB requests a download of the operating system from the console. Download includes any applicable cue data.

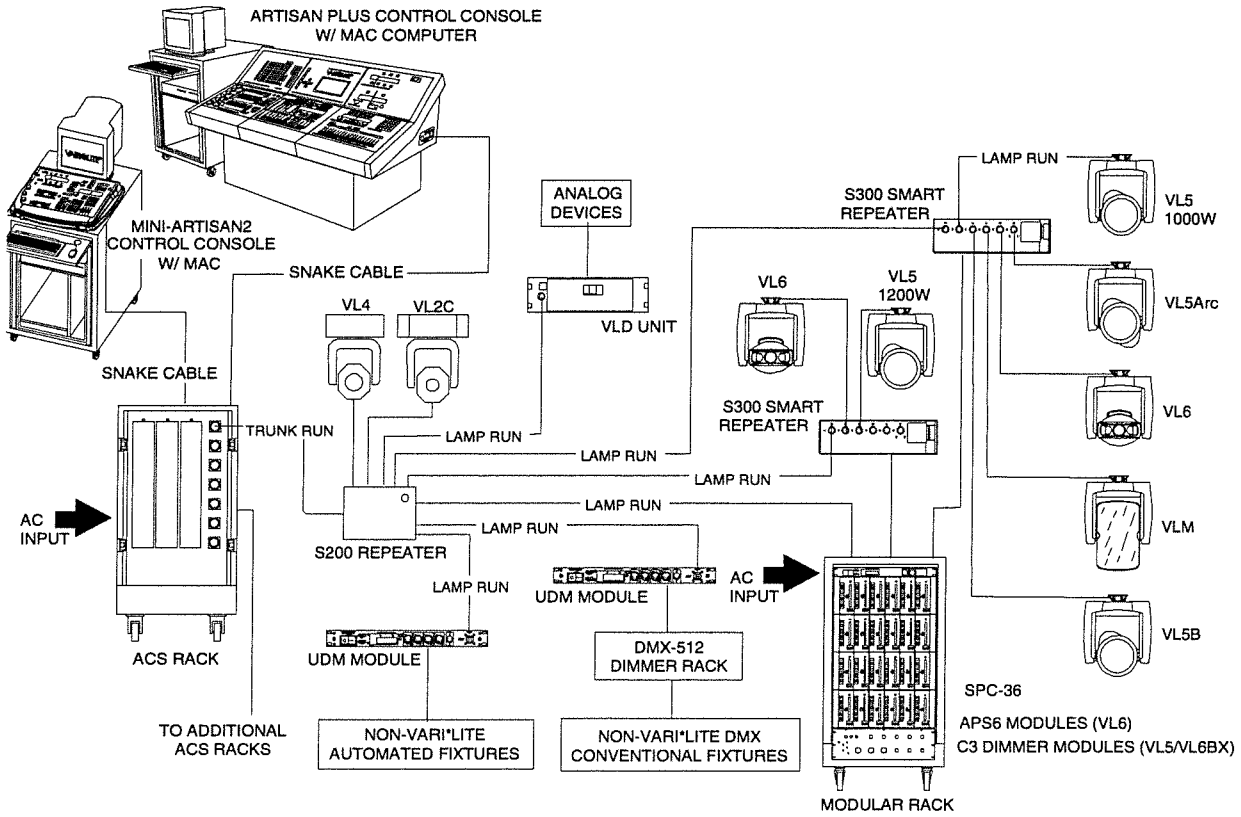
VL5Arc Lamp Control PCB

The **VL5Arc** luminaire requires one extra motor channel for the operation of the bellows and motor assembly. The **VL6** LCB, which contains five stepper motor channels instead of four, has been adapted for use with the **VL5Arc** luminaire by replacing the EPROM with a **VL5Arc** EPROM. Operation of the **VL5Arc** LCB is identical to the standard **VL5** LCB except for the extra motor channel.

1.4.2 System Diagram

The **VL5** luminaire is connected to the distribution system by its lamp input cable, which provides AC power and carries the data signal to and from the **Smart Repeater** unit. The **Smart Repeater** unit combines power and data signals from a source such as the ACS rack, mini ACS rack, or modular rack and provides it to the luminaire thru a single connector. The **Smart Repeater** unit receives lamp power from conventional dimmers or from the **Series 300 C3** or **APS6** power supply modules, which are installed in the modular rack SixPack chassis and sends it to the luminaire. The luminaire can be controlled by **VARI*LITE Series 200** Comm, which is operated from a choice of control consoles, such as the **Artisan® Plus**, **mini-Artisan® Plus**, or **mini-Artisan®2** console. These consoles provide control for all **VL5** luminaire functions. The **VL5** luminaire can also be controlled by DMX-512 data from a DMX controller, which can be connected to the **Smart Repeater** unit by a single XLR connector.

Pictured below is a system diagram illustrating some of the possible combinations of equipment, which can be used with the **VL5** luminaire. For an in-depth explanation of system setups, refer to **Series 200** System Manual (02-3004-0200).

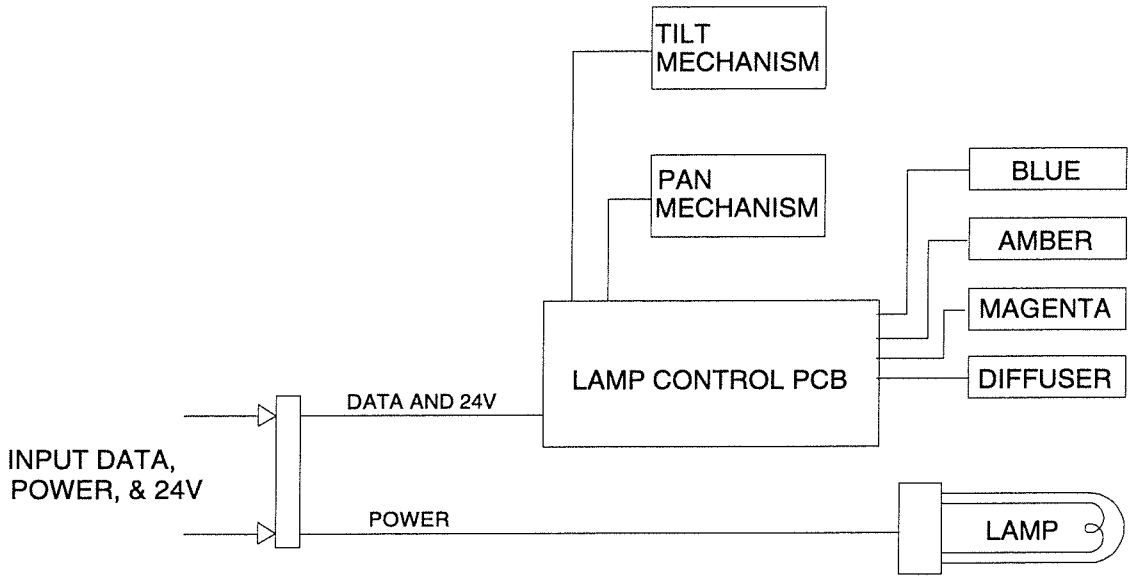


1.4.3 Data and Power Flow Diagrams

The following diagrams show how data and power are distributed in the different versions of the luminaire.

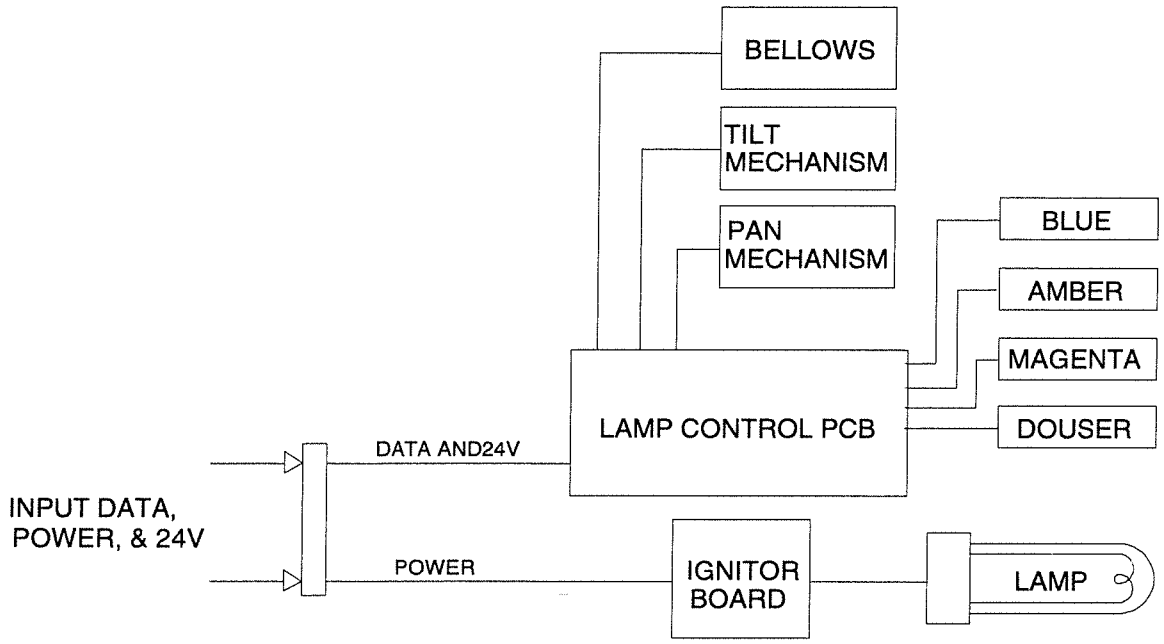
VL5/VL5B Diagram

Input data and power is supplied to the Lamp Control PCB (LCB). The LCB controls the tilt and pan mechanism motors and actuator motors driving the blue, amber, magenta, and diffuser panels. Power is supplied directly to the lamp.



VL5Arc Diagram

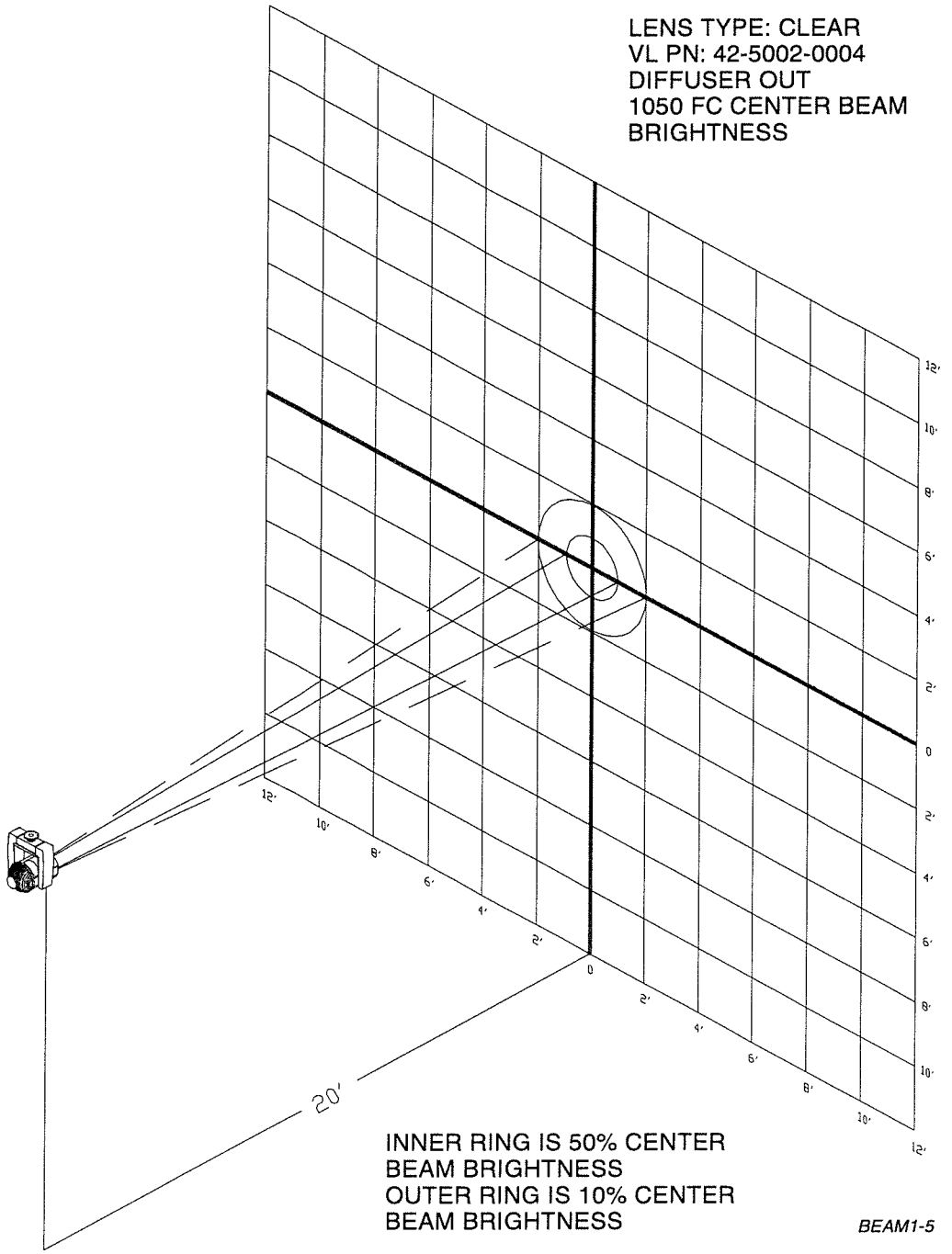
Input data and power is supplied to the Lamp Control PCB (LCB). The LCB controls the tilt and pan mechanism motors and the bellows motor. Actuator motors driving the blue, amber, magenta, and douser panels are also controlled by the LCB. Power is supplied to an ignitor board, which supplies it to the lamp.



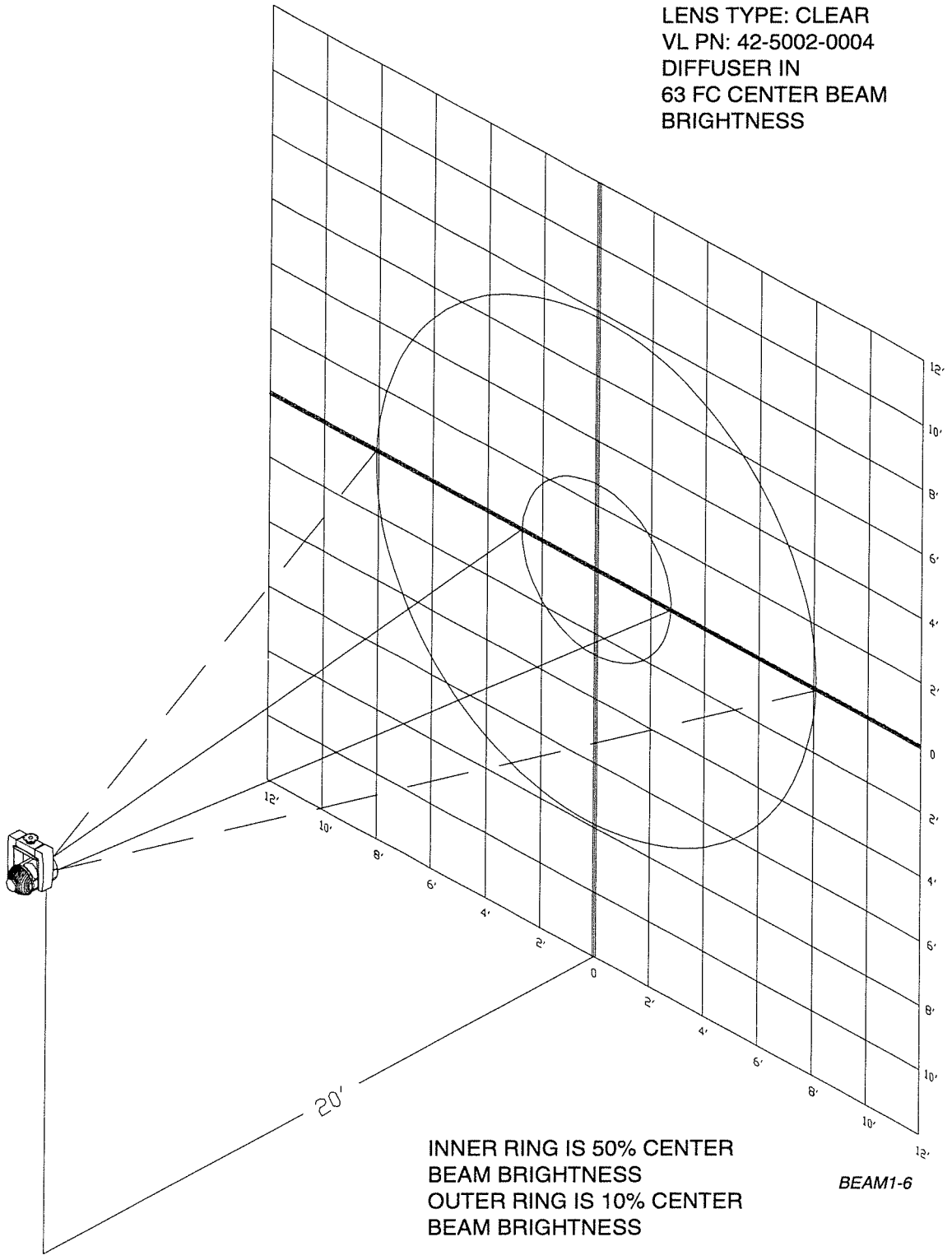
1.5 Beam Charts

The following drawings display luminaire beam specifications for the standard **VL5** luminaire. In all drawings, the luminaire is located 20 feet (6.1 m) from the center of a flat surface grid. This grid is divided in 2 foot (61 cm) sections.

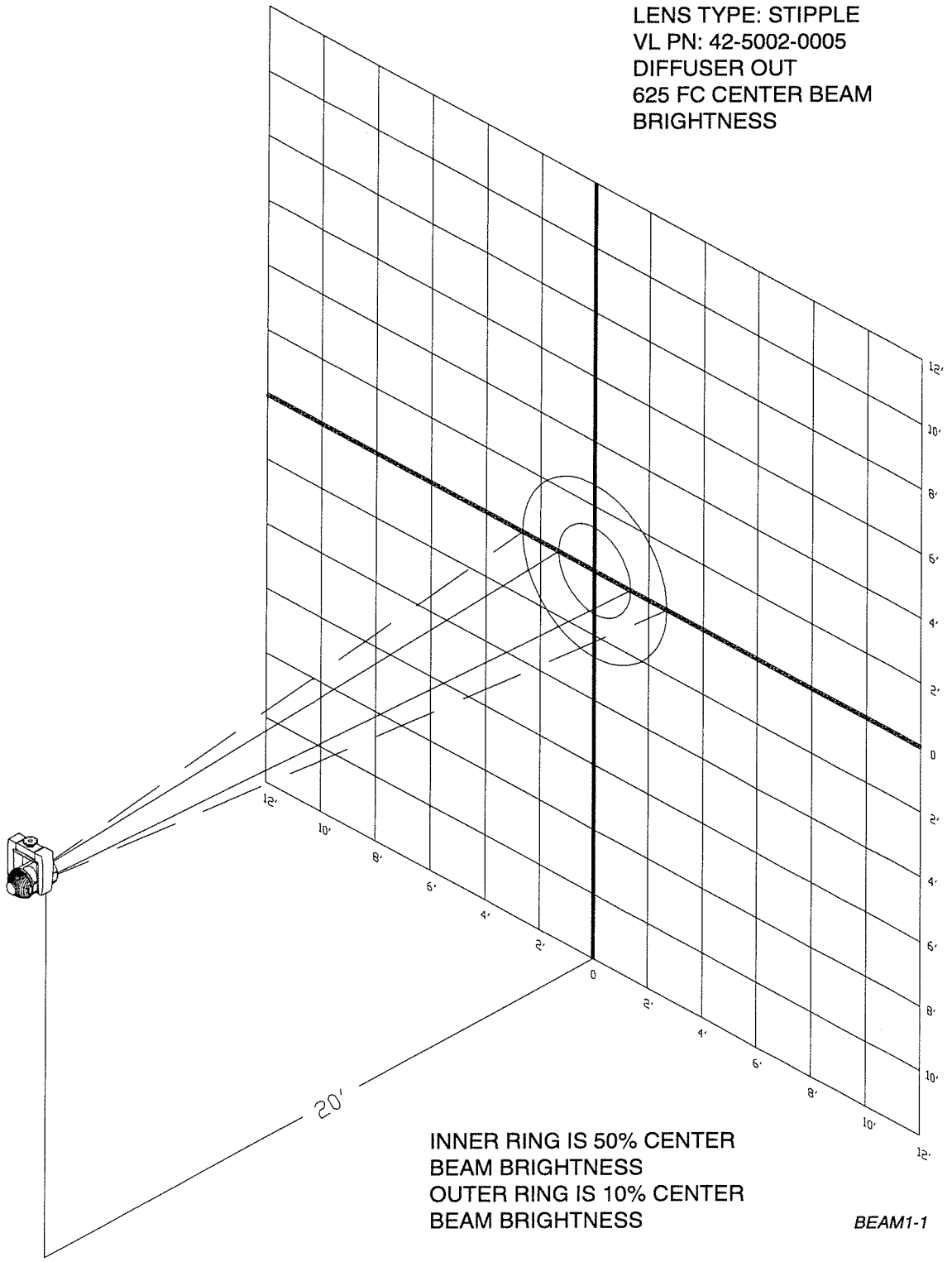
1.5.1 *VL5* - Clear Lens/Diffuser Out



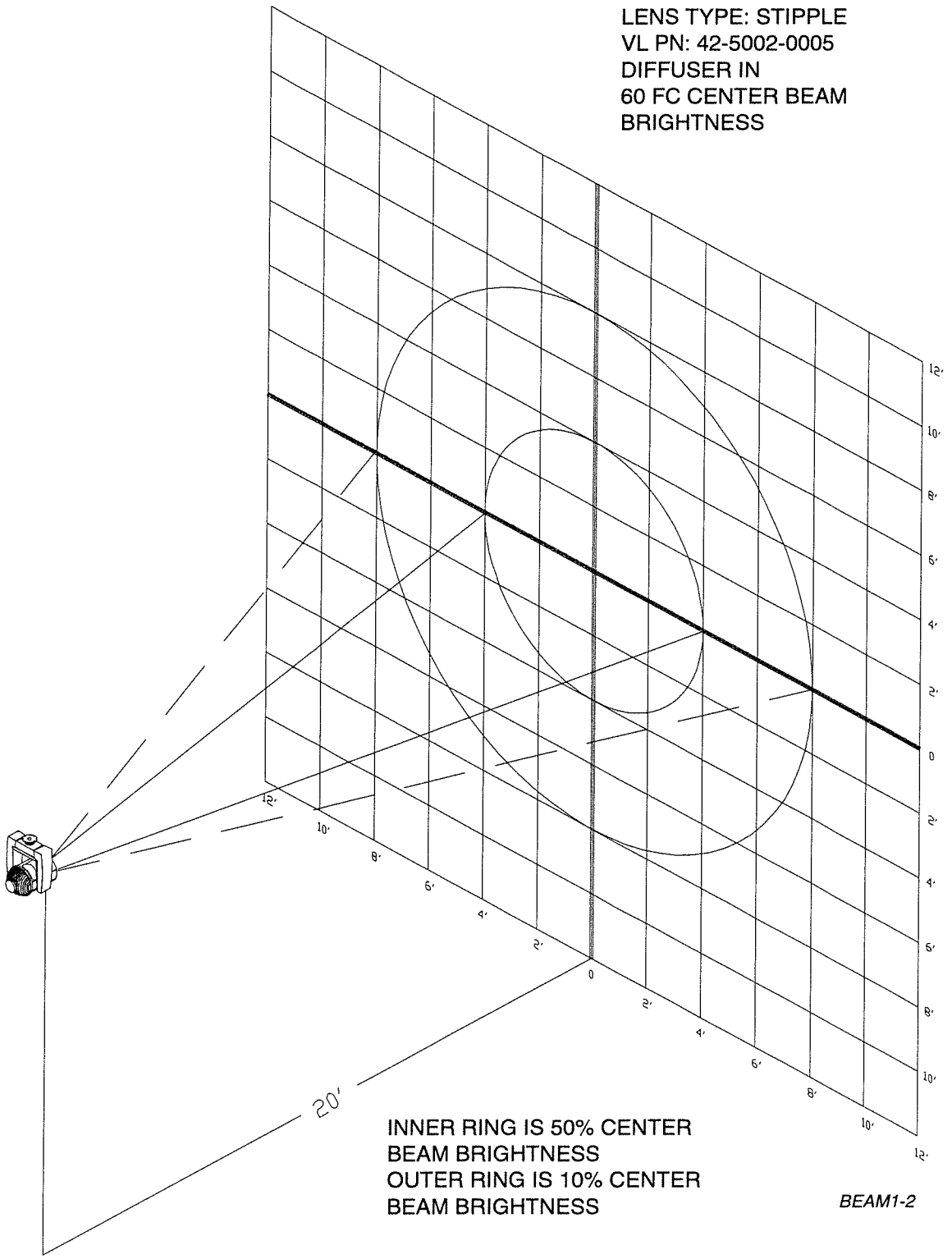
1.5.2 *VL5* - Clear Lens/Diffuser In



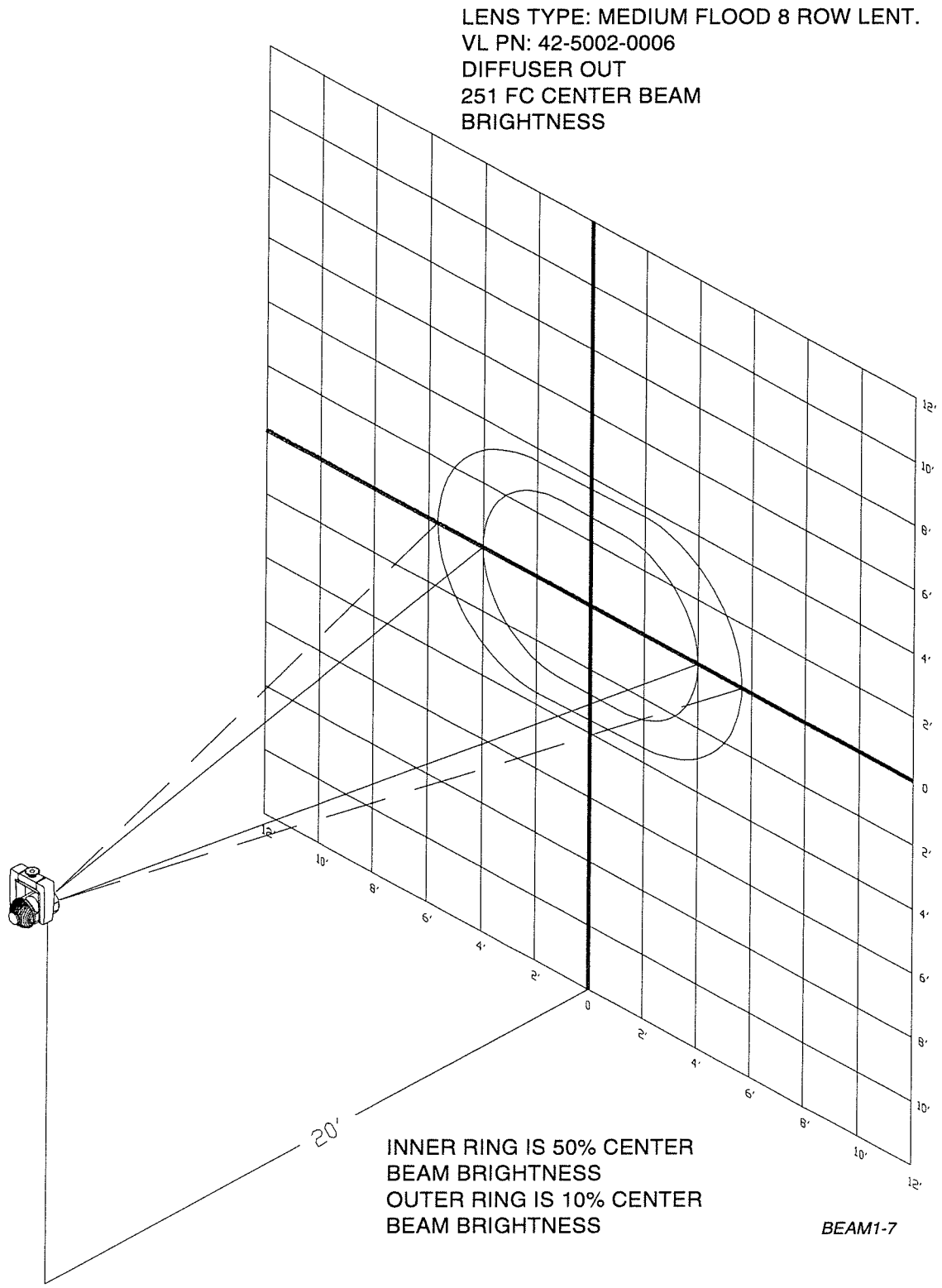
1.5.3 *VL5* - Stipple Lens/Diffuser Out



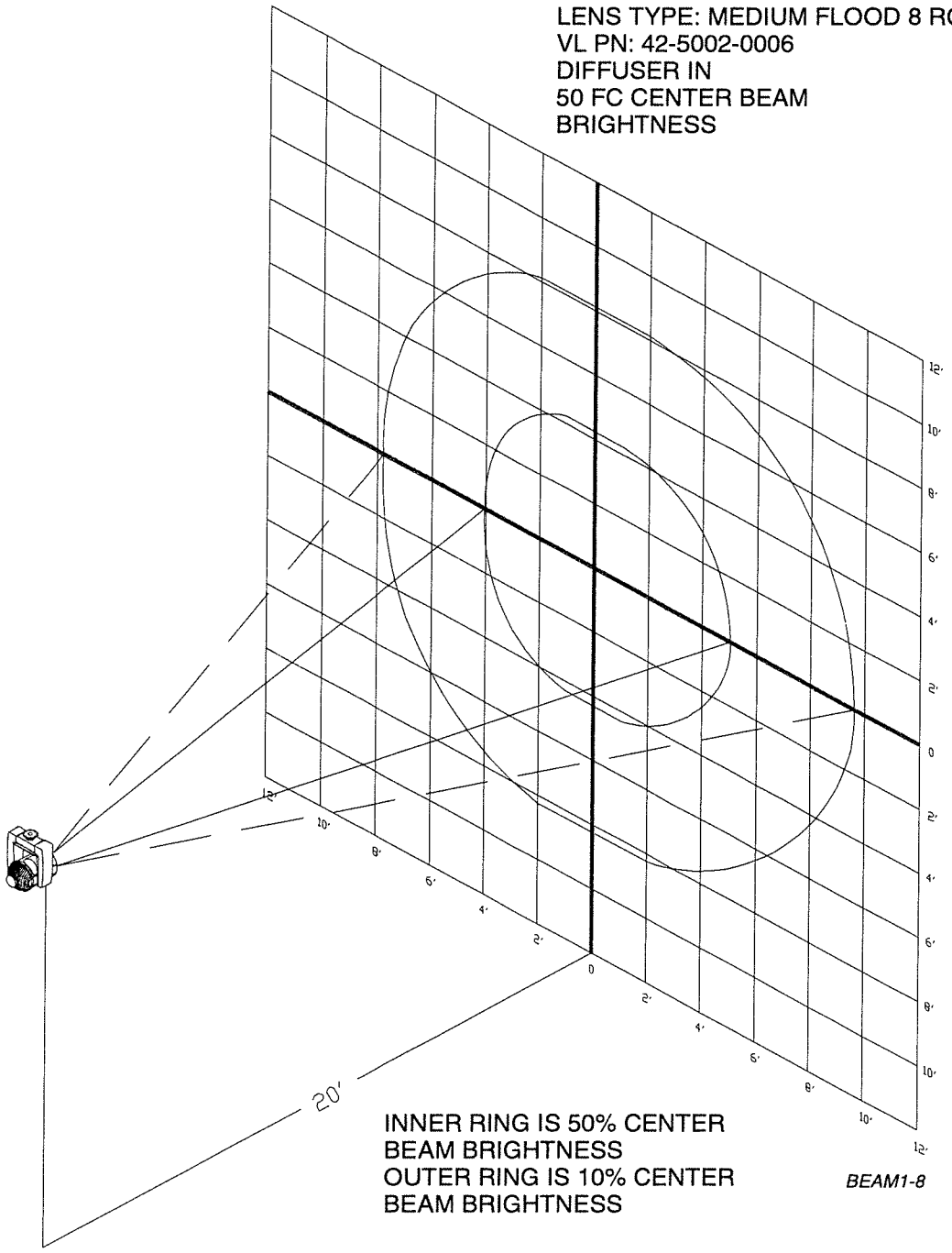
1.5.4 *VL5* - Stipple Lens/Diffuser In



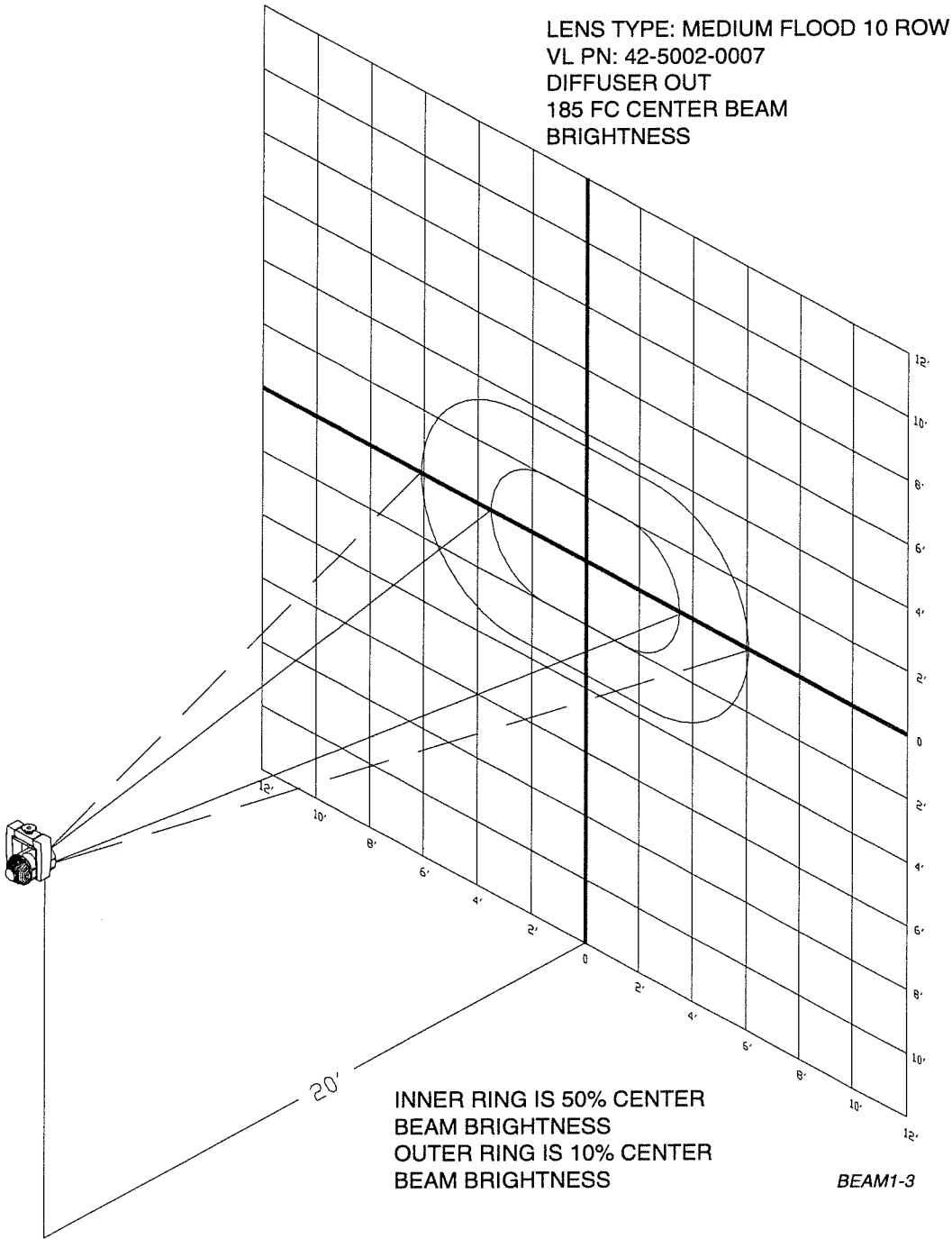
1.5.5 *VL5* - Medium Flood 8 Row Lenticular Lens/Diffuser Out



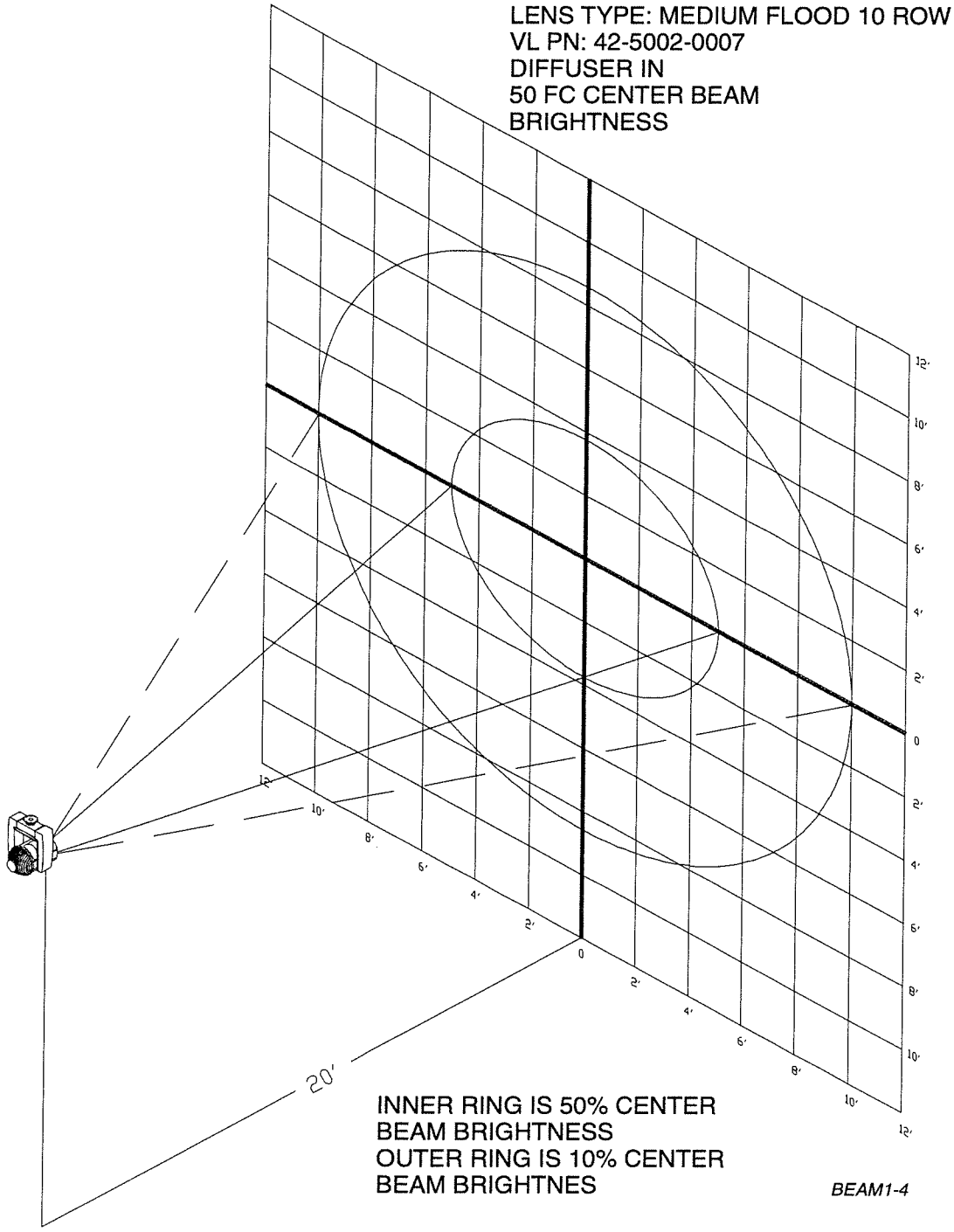
1.5.6 *VL5* - Medium Flood 8 Row Lenticular Lens/Diffuser In



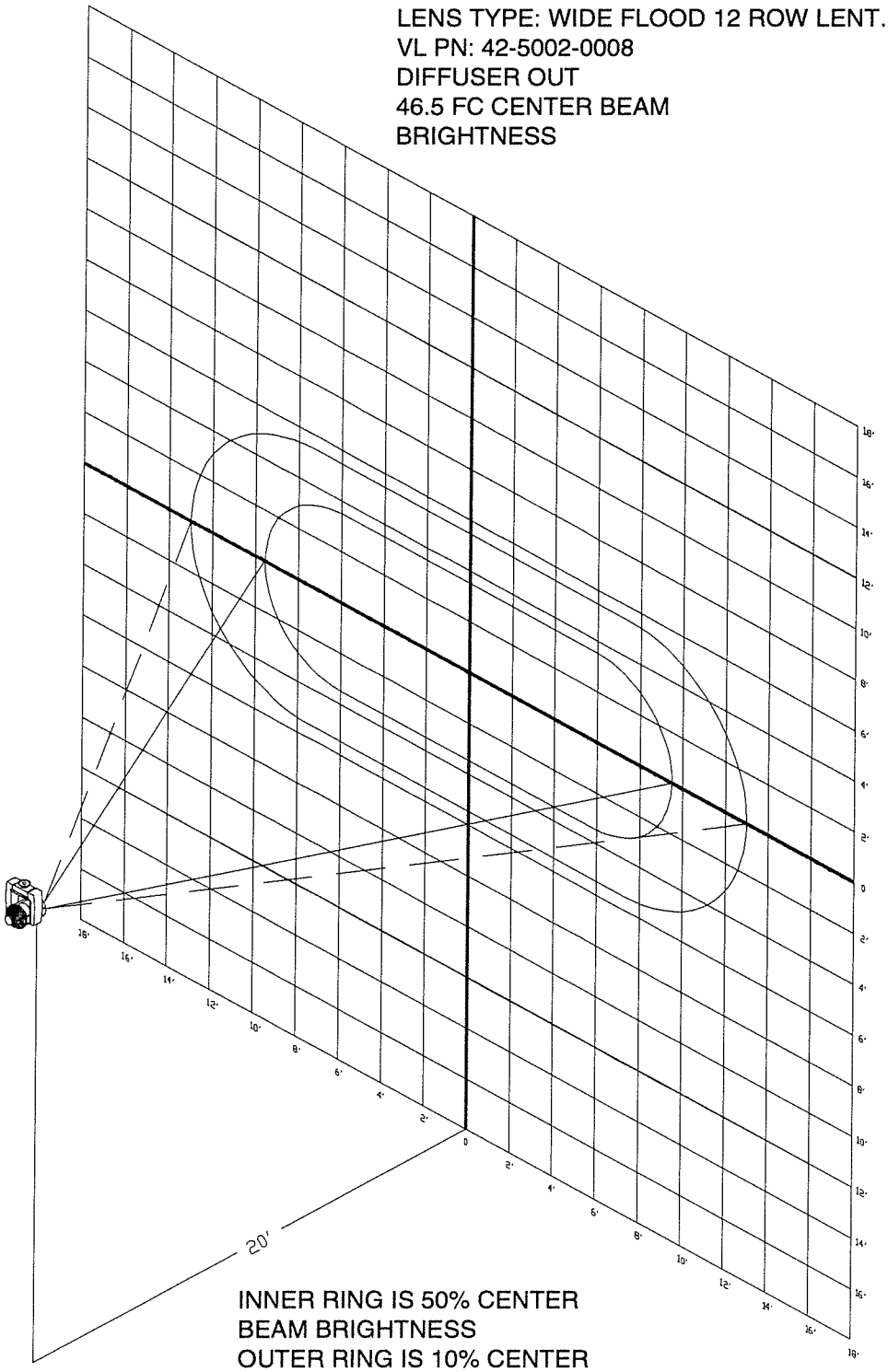
1.5.7 *VL5* - Medium Flood 10 Row Lenticular Lens/Diffuser Out



1.5.8 *VL5* - Medium Flood 10 Row Lenticular Lens/Diffuser In

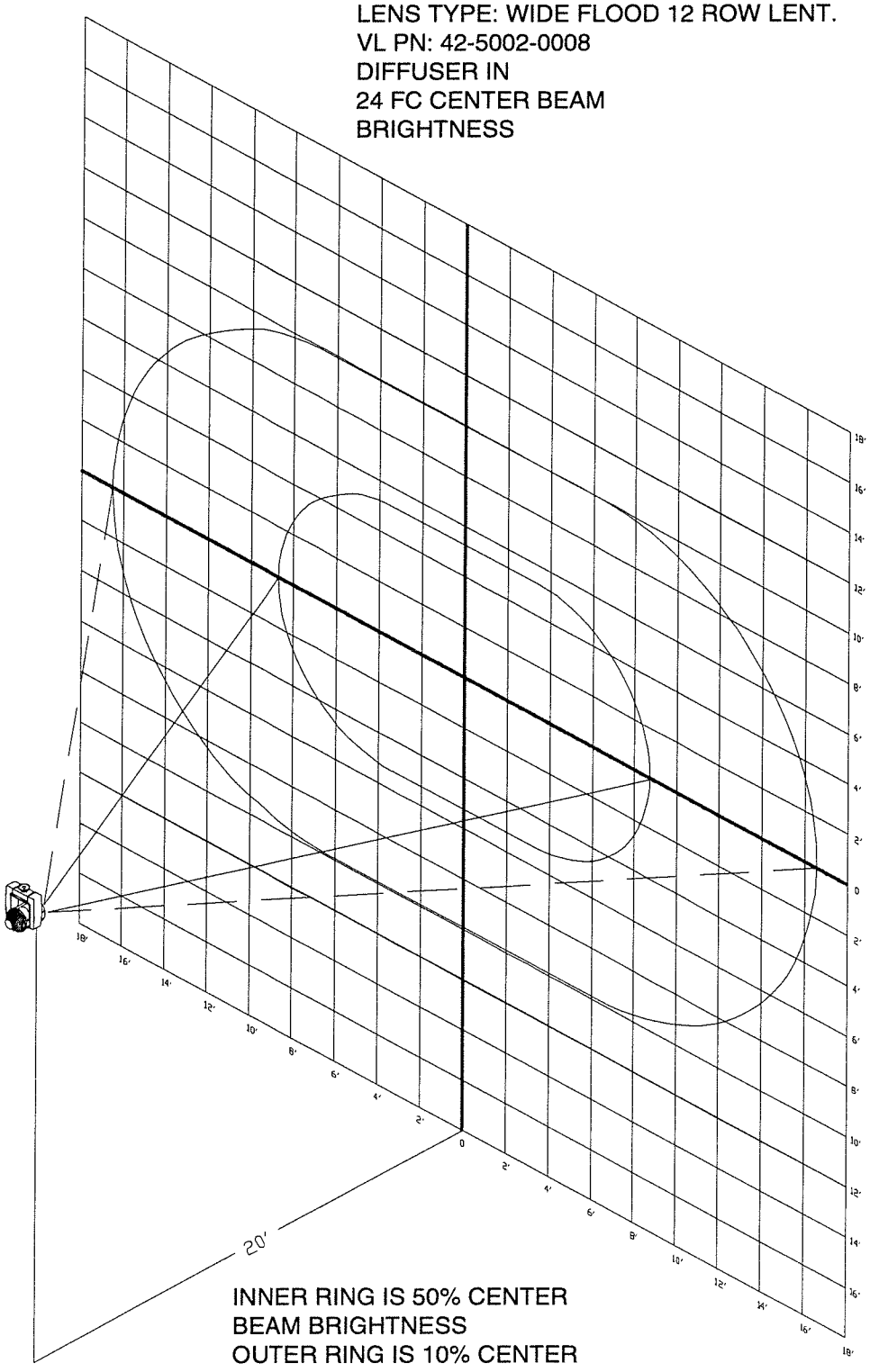


1.5.9 *VL5* - Wide Flood 12 Row Lenticular Lens/Diffuser Out



1.5.10 *VL5* - Wide Flood 12 Row Lenticular Lens/Diffuser In

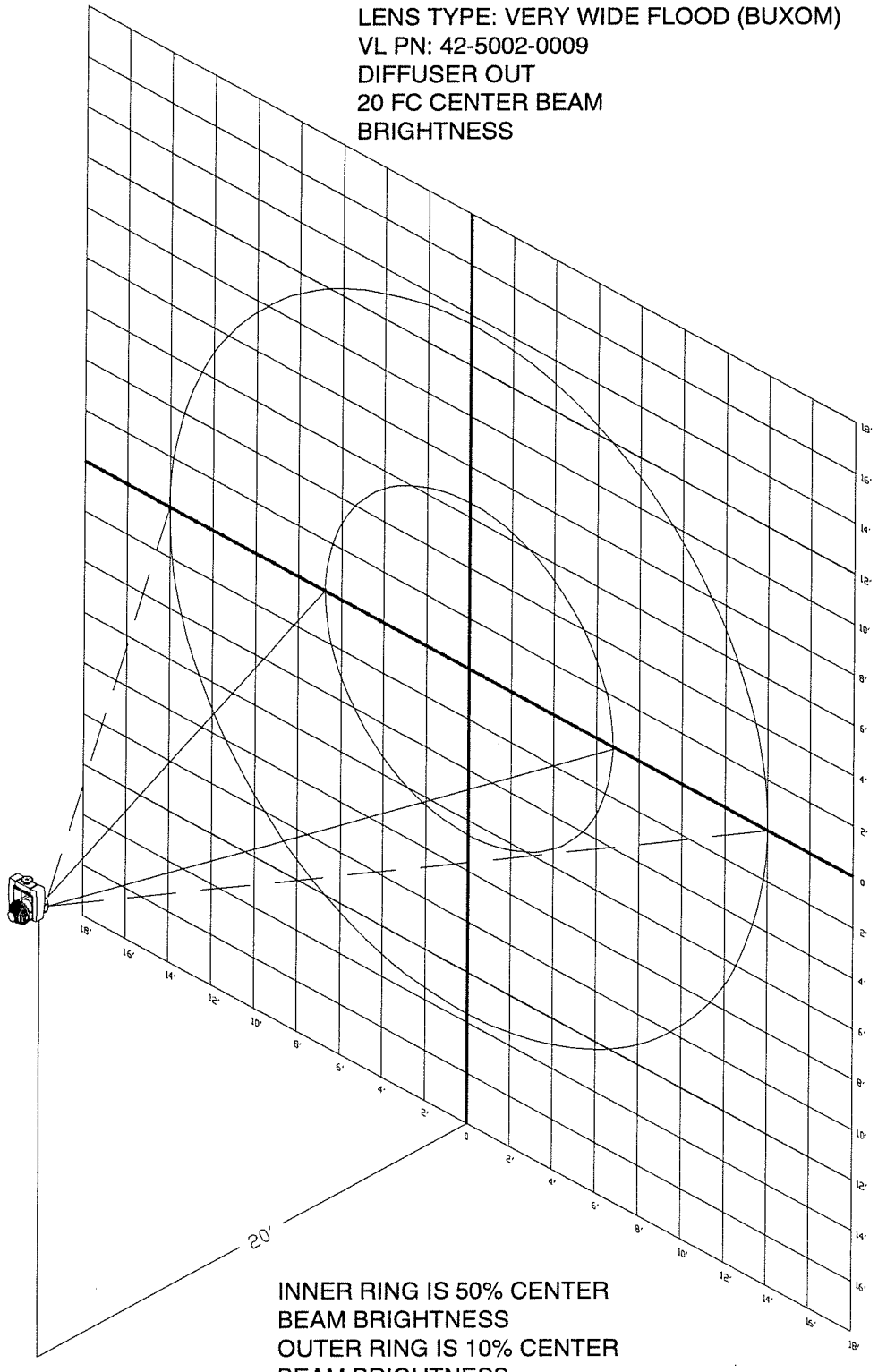
LENS TYPE: WIDE FLOOD 12 ROW LENT.
VL PN: 42-5002-0008
DIFFUSER IN
24 FC CENTER BEAM
BRIGHTNESS



INNER RING IS 50% CENTER
BEAM BRIGHTNESS
OUTER RING IS 10% CENTER
BEAM BRIGHTNESS

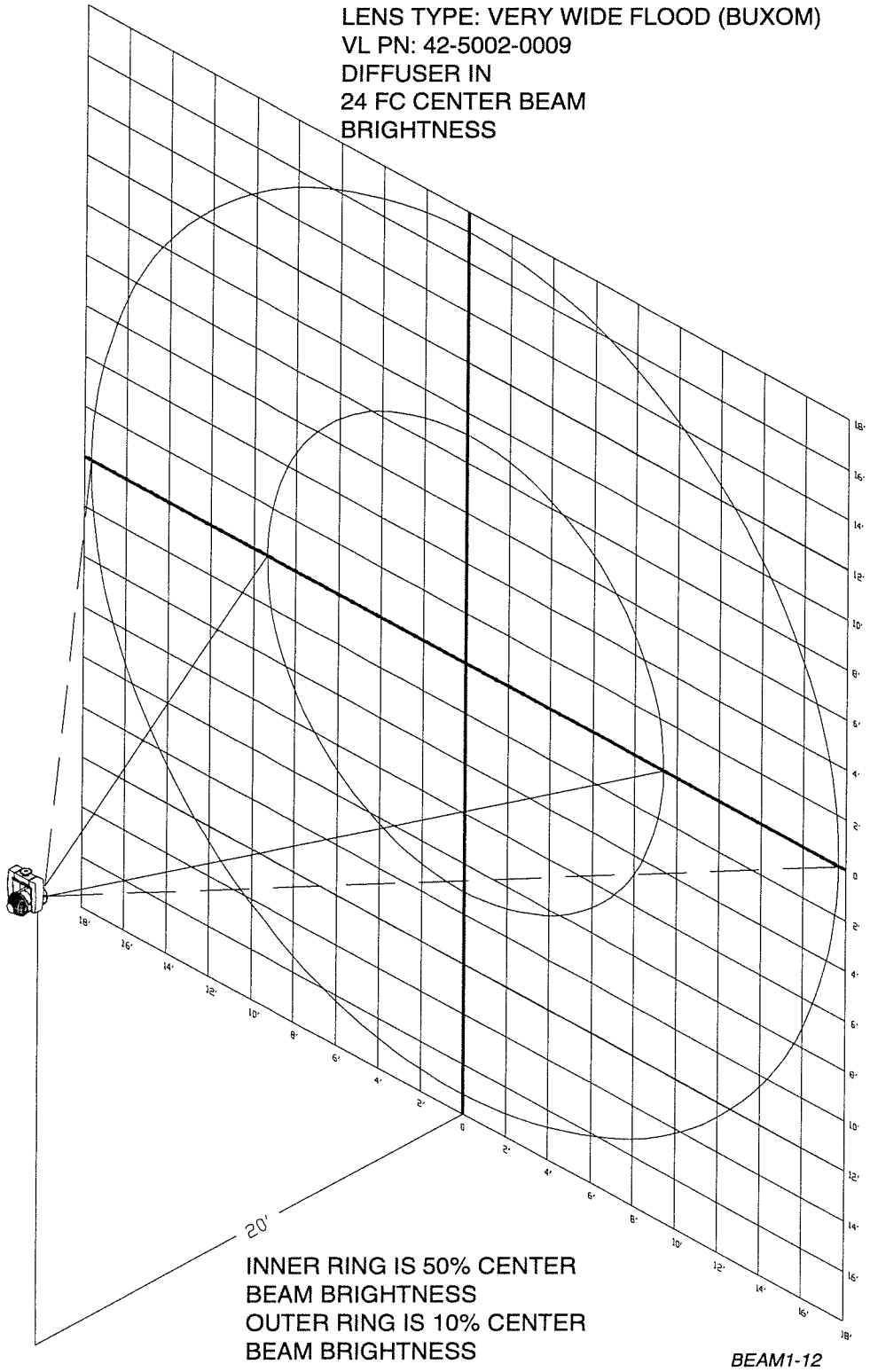
BEAM1-10

1.5.11 *VL5* - Very Wide Flood (Buxom) Lenticular Lens/Diffuser Out



BEAM1-11

1.5.12 *VL5* - Very Wide Flood (Buxom) Lenticular Lens/Diffuser In



Chapter 2. Installation and Operation

This chapter contains the following sections:

2.1 Installation

2.2 Checkout

2.3 Installing **VL5** Accessories

2.4 Operation

Procedures for installing the **VL5** luminaire are included in the installation section. The checkout section ensures proper operation of the equipment after installation. Installing **VL5** Accessories section provides instructions for installing the luminaire mounting equipment and customizing accessories.

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2.1 Installation

2.1.1 Installation Methods

VL5 luminaires can either be hung from a truss or similar structure, or mounted on floor stands. The hanging method requires a special double truss hook, which is bolted to the luminaire's pan tube. The floor mounting method requires a special floor stand, which is installed in place of the truss hook.

Refer to Installing **VL5** Accessories section for hook and floor stand installation instructions.

2.1.1.1 Hanging Method

VL5 luminaires are generally hung from pipes or trusses, and suspended above the object of illumination. The truss hook fits securely on any pipe with an outer diameter between 1 and 2 inches (25.40 to 50.80 mm). The use of square pipe is not recommended. The truss hook is clamped to the pipe or truss by turning the wing bolt, installed in one of two threaded holes in the truss hook, clockwise. The wing bolt should be tightened only by hand. Do not use wrenches or other tools as this can damage the truss or the hook.

Luminaire input connectors are used as reference points when hanging instruments. The hanging orientation of the luminaire on the truss or pipe determines which direction the luminaire will initially move from the luminaire zero position when the pan and tilt controls are manipulated from the control console. With **Series 200** control, all luminaires move to their zero position when they finish calibration (head and yoke half-way between stops).

Distance-To-Distance Requirements

Refer to the following table for **VARI*LITE** luminaire distance-to-distance requirements.

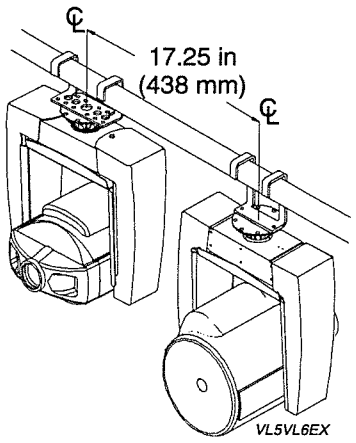
Luminaire	VL2B/ VL2C	VL4	VL5	VL6	VLM
VL2B/ VL2C	21.50 in. 546 mm	19.50 in. 495 mm	19.75 in. 502 mm	19.00 in. 483 mm	19.50 in. 495 mm
VL4	19.50 in. 495 mm	17.50 in. 445 mm	17.75 in. 451 mm	17.00 in. 432 mm	17.50 in. 445 mm
VL5/VL5Arc/ VL5B	19.75 in. 502 mm	17.75 in. 451 mm	18.00 in. 457 mm	17.25 in. 438 mm	17.75 in. 451 mm
VL6	19.00 in. 483 mm	17.00 in. 432 mm	17.25 in. 438 mm	16.50 in. 419 mm	17.00 in. 432 mm
VLM	19.50 in. 495 mm	17.50 in. 445 mm	17.75 in. 451 mm	17.00 in. 432 mm	17.50 in. 445 mm

Example: To find center-to-center distance between **VL5** and **VL6** luminaire:

Step 1. On chart, find **VL6** luminaire on top row and **VL5** luminaire on side row

Step 2. From **VL6** luminaire on top row follow chart down. From **VL5** luminaire on side row follow chart to right.

Step 3. Where two rows meet is correct distance (17.25 in. or 438 mm).



Clearances

The following page contains hang views of the **VL5** luminaire (**Figure 2-1**). The luminaire is shown hung in the standard hang position on a two inch pipe with the input cable parallel to the pipe. The standard hang facilitates use of the copy channel feature of the control consoles, and coordinates the luminaire's response to tilt knob action when in the reset position.

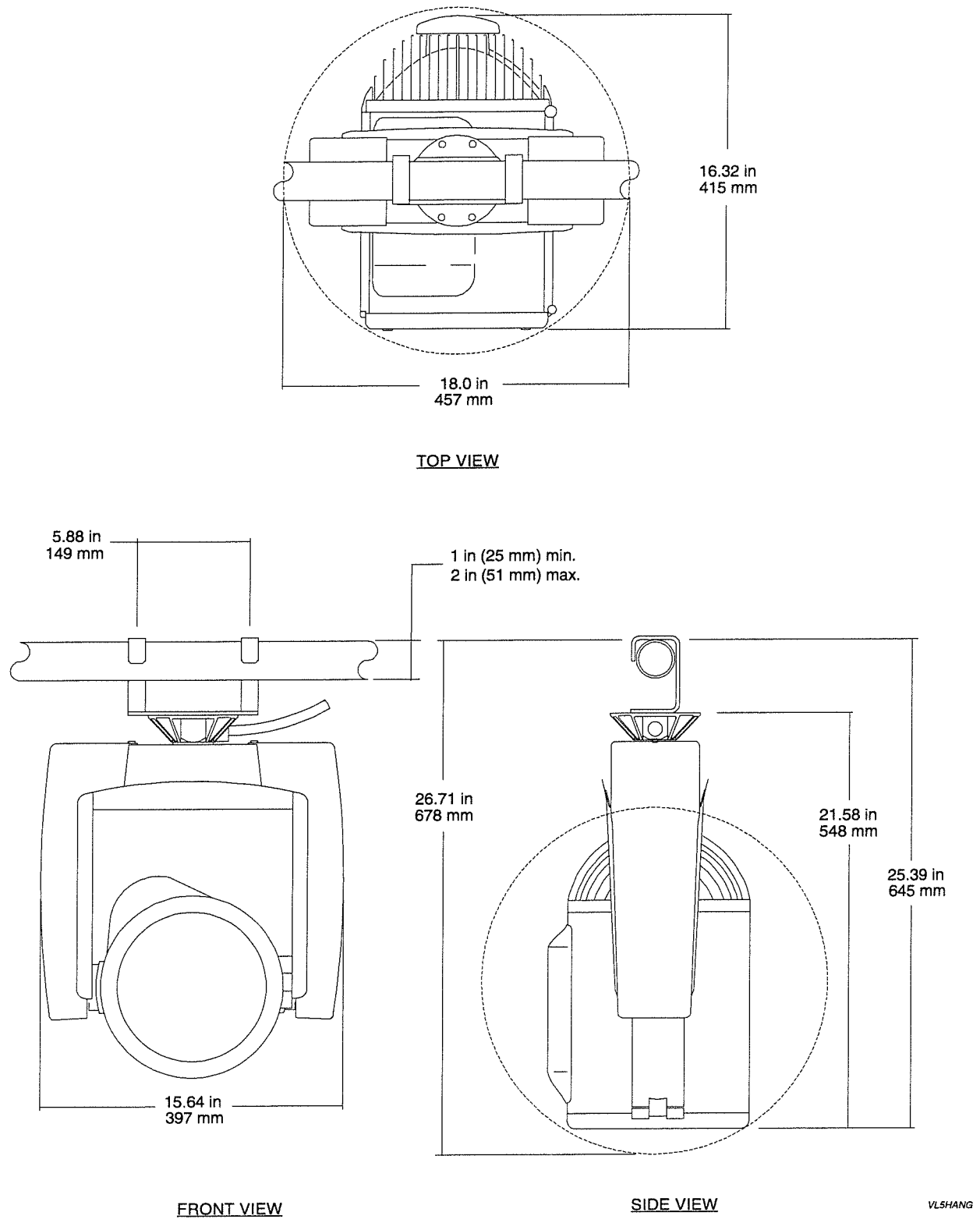


Figure 2-1. *VL5* Luminaire Hanging Clearances

To hang *VL5* luminaires:

Step 1. Determine the hanging orientation of the luminaires. The orientation is usually denoted on a lighting plot (refer to **Series 200** System Manual). Ensure the following:

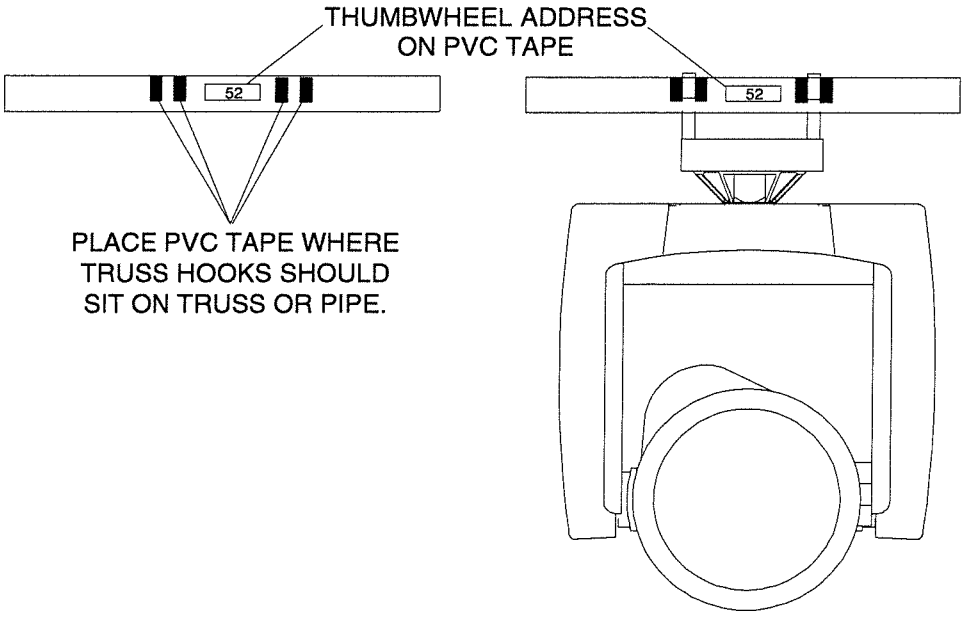
a. The pipe for mounting luminaires is be between 1 and 2 inches (25.40 to 50.80 mm) in diameter (**Figure 2-1**).

b. The structure is secure and capable of supporting total luminaire load. Refer to Dimensions and Weight paragraph in Chapter 1.

c. Sufficient clearance space is provided for each luminaire.

Tip: It is recommended that the all luminaire input connectors be orientated facing stage left. Refer to Hanging Method paragraph.

Step 2. Once position of each luminaire is determined, it is good idea to mark each hanging position with PVC tape for future reference.



Step 3. Remove luminaires from road case by lifting straight upwards.

CAUTION: Tighten wing bolts by hand to avoid damaging hook or truss.

Step 4. Attach luminaires to mounting truss as shown in **Figure 2-2**. Tighten wing bolts by hand to secure in place.

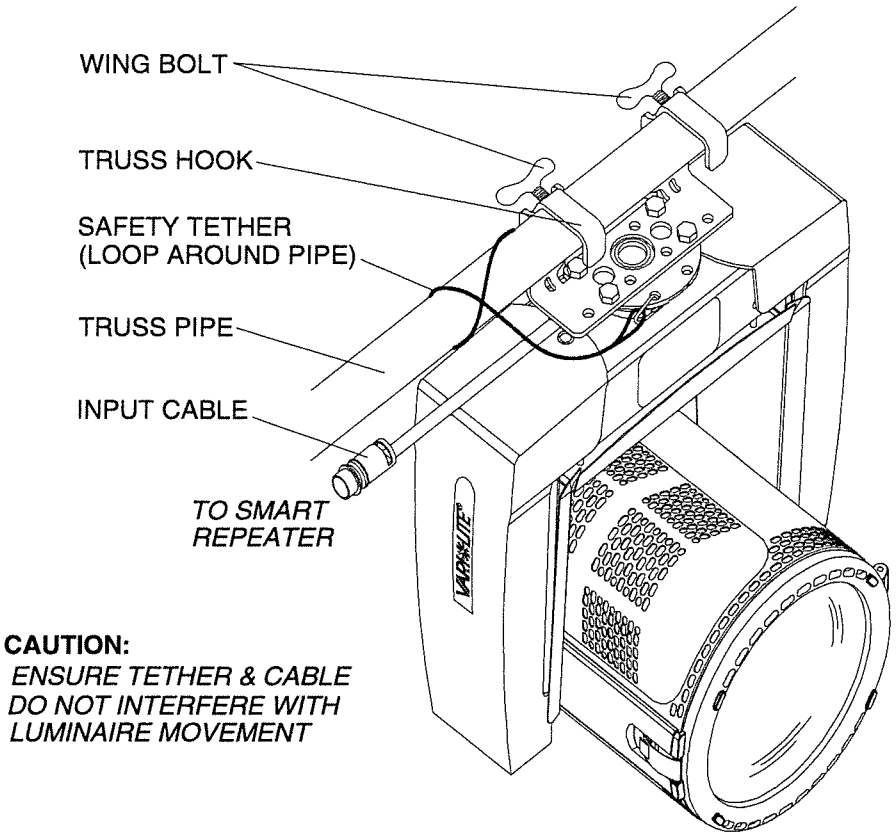


Figure 2-2. *VL5* Luminaire Hanging

Step 5. Loop safety cable around pipe two or three times leaving as little slack as possible and attach clip to opposite side of pan tube. Ensure that the safety cable will not interfere with luminaire movement.

Step 6. Connect input cable to **Smart Repeater** unit lamp output port via a lamp run extension cable of the required length. Ensure that the cables will not interfere with luminaire movement.

2.1.1.2 Floor Mount Method

VL5 luminaires can also be installed in a floor mount configuration using a special floor stand.

Clearances

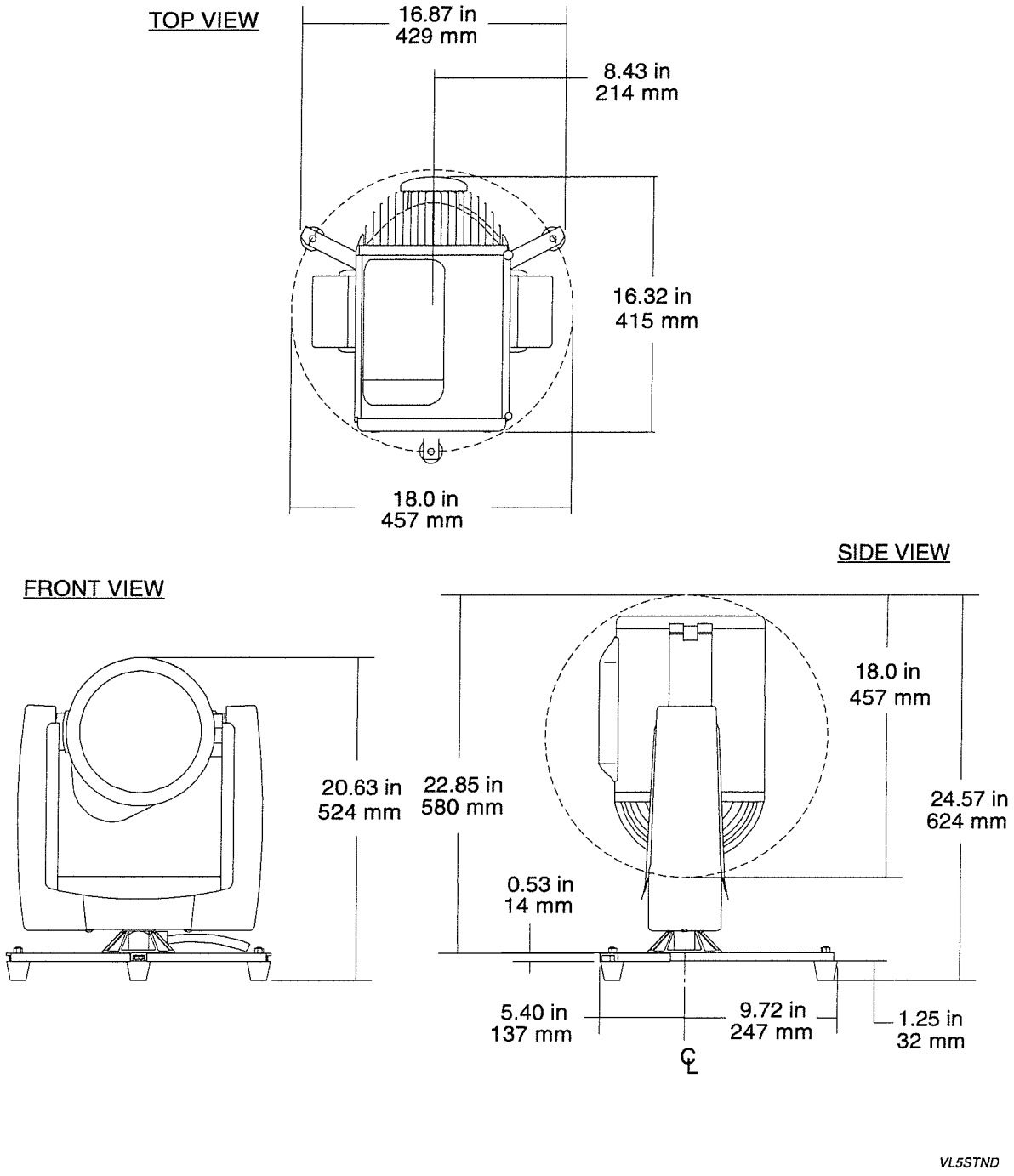


Figure 2-3. *VL5* Floor Mounting Clearances

To floor mount *VL5* luminaires:

Step 1. Determine the orientation of the luminaires. The orientation is usually denoted on a lighting plot (refer to **Series 200** System Manual). Ensure the following:

a. The structure is secure and capable of supporting total luminaire load. Refer to Dimensions and Weight paragraph in Chapter 1.

b. Sufficient clearance space is provided for each luminaire (**Figure 2-3**).

Tip: It is recommended that the all luminaire input connectors be orientated facing stage left.

Step 2. Once position of each luminaire is determined, it is good idea to mark each floor mounting position with PVC tape for future reference.

Step 3. Remove luminaires from road case by lifting straight upwards.

Step 4. Extend the pivoting legs all the way for maximum stability. Place luminaire in position so that the input cable exits towards stage left to match the standard hung luminaires.

Step 5. Connect input cable to **Smart Repeater** unit lamp output port via a lamp run extension cable of the required length. Ensure that the cables will not interfere with luminaire movement.

2.1.2 Luminaire Packing

In order to ensure that luminaires are not damaged during shipment, it is important to properly pack in the case.

To pack *VL5* luminaire:

Step 1. At console or **Smart Repeater** unit, run pack-up cue to place luminaire in proper orientation for transport. (The pack-up cue should put all three filter sets and diffuser panels in fully open position. Pan should be 180° from stops and tilt halfway between stops.)

Step 2. Disconnect luminaire input cable from system and remove luminaire from truss or floor.

Step 3. Secure input cable and pack as follows:

CAUTION: If allowed to hang freely, the connectors of free-hanging input cables can come to rest on the yoke leg covers of adjacent units. When the road case cover is closed, input connectors can be pressed onto the yoke leg covers by the road case covers. The resulting stress can cause either cracks or depressions in the yoke leg covers and could cause sections of the yoke leg covers to break off.

a. For luminaires with truss hooks installed, route input cable under truss hook uprights and orient the loop so that it faces toward the center of the case (**Figure 2-4**). Lower luminaire head first into road case.

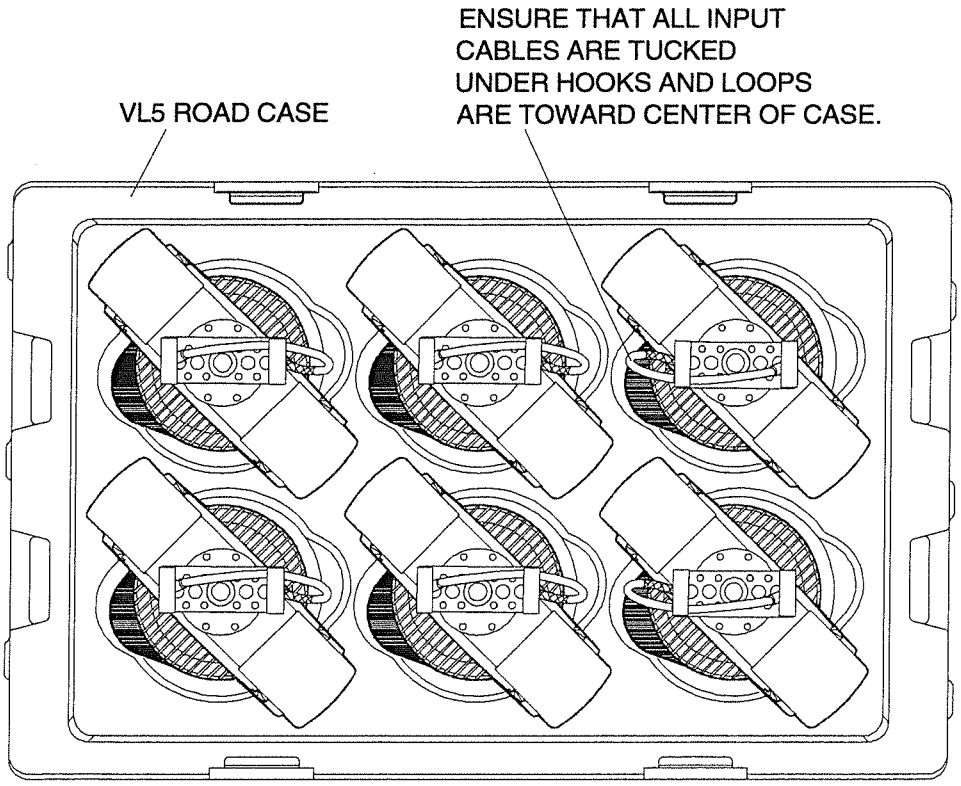


Figure 2-4. Packing a *VL5* Luminaire with Truss Hook Installed

b. For luminaires with floor stands installed, fold stand into packing position. Place input cable between the yoke top cover and the luminaire head (**Figure 2-5**). Lower luminaire head first into road case.

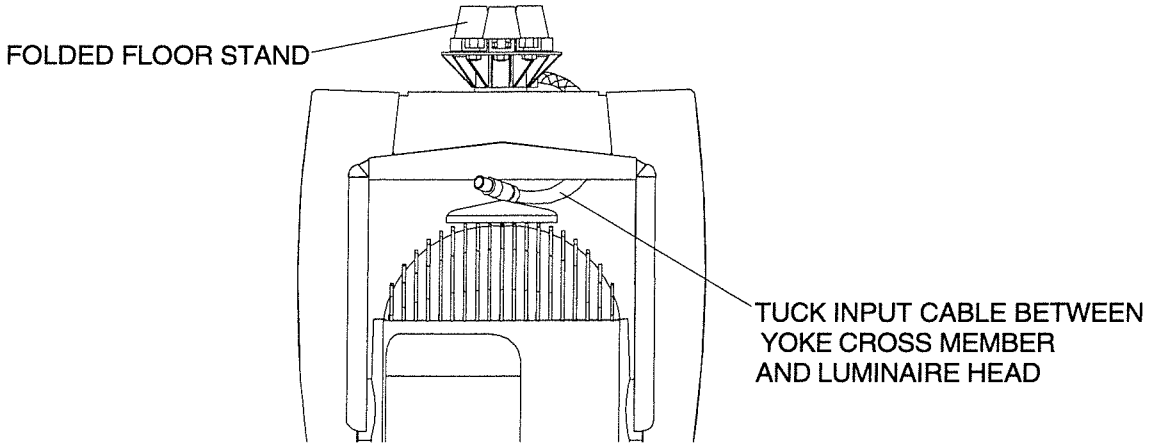


Figure 2-5. Packing a *VL5* Luminaire with Floor Stand Installed

Step 4. Close and latch road case lid, ensuring that all latches are properly secured.

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2.2 Checkout

Use this procedure to verify proper equipment operation.

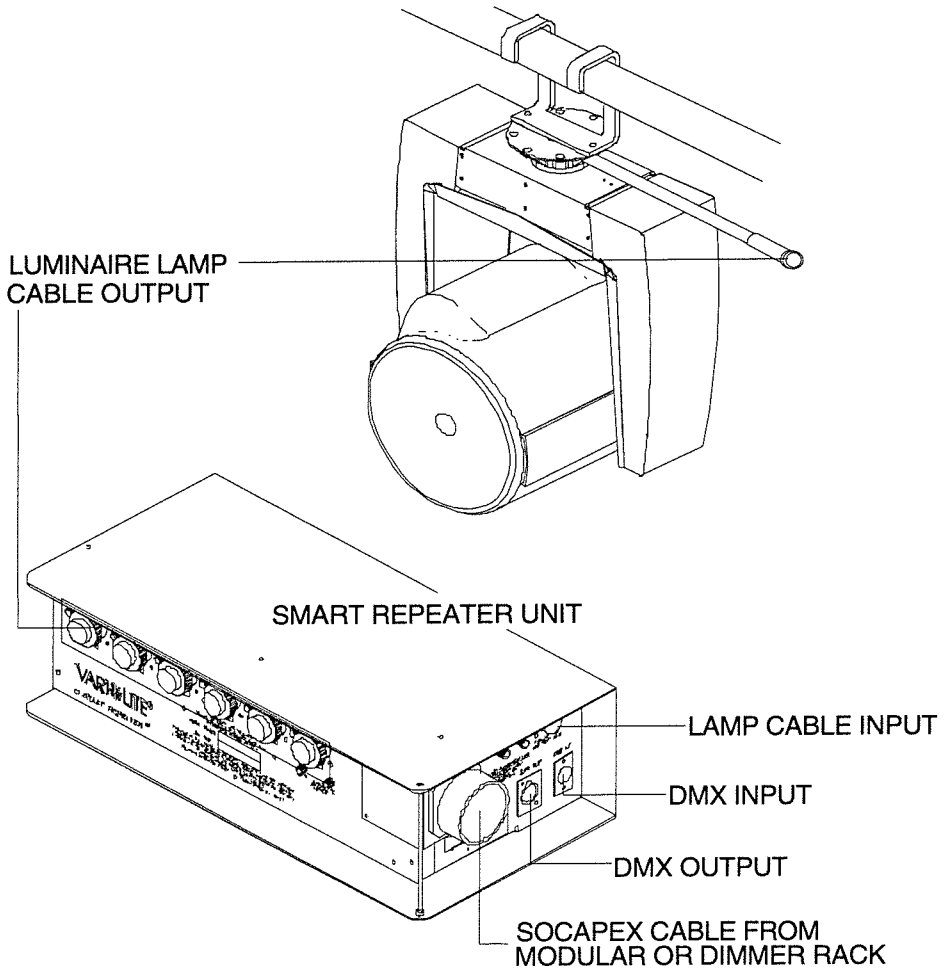
2.2.1 Power-Up

Step 1. Connect luminaire to either a **VARI*LITE Series 200** console or a DMX controller (refer to DMX Operation paragraph) via a **Smart Repeater** unit.

Step 2. Supply system power to luminaire.

Step 3. Watch for luminaire calibration. If luminaire does not calibrate, check lamp cable connection.

Step 4. Verify that luminaire responds to control console commands. (Instructions for exercising luminaire functions should be referenced from the operator's manual that accompanies that particular controller.) If luminaire does not respond properly, refer to Test and Fault Isolation sections in Chapter 3.



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2.3 DMX Operation

2.3.1 *Smart Repeater* Unit DMX Operation

Software that enables control of luminaires/moving mirrors from DMX consoles resides in EPROM in the **Smart Repeater** unit. The **Smart Repeater** unit accepts DMX-512 protocol.

To provide power to **Smart Repeater** unit, connect to 120 Vac power source using VLSR AC Input Cable Assy 25-9623-0175; connect to **Smart Repeater** unit at the SERIES 200 INPUT connector. Make sure to terminate DMX-512 cable system with DMX terminator Plug 23-9623-0177.

What is a DMX Data Channel?

A DMX data channel is 8 or 16 bits of absolute parameter data, depending on the mode. A DMX data packet is a group of 1 to 512 data channels. Each sequential group of seven (8-bit mode) or nine (16-bit mode) data channels controls one **Series 300** fixture.

Each **Smart Repeater** unit responds to 42 or 54 DMX channels, depending on the mode, and distributes seven or nine channels accordingly to each of the six luminaire output ports. Each moving mirror accepts DMX data and interprets the data as follows:

8-bit mode: Pan-Coarse / Pan-Fine / Tilt-Coarse / Tilt-Fine / Rotation Speed Forward / Rotation Speed Backward / Nothing

16-bit mode: Pan (two, 8-bit channels) / Tilt (two, 8-bit channels) / Rotation Speed Forward / Rotation Speed Backward / Nothing / Nothing / Nothing

8-Bit or 16-Bit Mode?

With Software Version 4.0, the **Smart Repeater** unit supports 8-bit and 16-bit modes (default). The 8-bit mode operates the same as in S.V. 3.0 and previous versions. 8-bit mode is intended for older DMX desks, so that fixtures can be focused with an 8-bit coarse control and fine tuned with an 8-bit fine control. Fine control is weighted to provide a more responsive feel. To operate the **Smart Repeater** unit in 8-bit mode, an RJ-45 loopback plug (25-9623-0499) must be installed prior to power up.

16-bit control is intended for DMX desks that address the new 16-bit standard. 16-bit commands provide smoother motion than the 8-bit commands. If this mode is used on an 8-bit desk, little or no affect will be produced by moving the fine control.

DMX or VL Comm?

If **VARI*LITE** Communications are present when power is first applied, the **Smart Repeater** unit ignores DMX data. (The units look for VL Comm for about a minute-and-a-half before looking for DMX data). If VL Comm are not present, the unit waits until either DMX data or VL Comm appear. Whichever data format appears first then controls the unit until you cycle AC power.

Setting the Thumbwheel Switch

Set **Smart Repeater** unit thumbwheel switch to set the *start address* for DMX-512 conversion:

000	Reserved for TEST mode.
001-505	Valid 8-bit start addresses.
001-503	Valid 16-bit start addresses.
504-999 or 506-999*	Invalid start addresses (unit remains idle; fixtures do nothing).

Reading the Seven-Segment Display

While in DMX mode, the seven-segment display indicates the following:

Display Readout	Explanation
d-8 (flashing in looping sequence)	DMX (repeater is in 8-bit DMX mode and DMX data is received)
d-1-6 (flashing in looping sequence)	DMX (repeater is in 16-bit DMX mode and DMX data is received)
n	No DMX (repeater is in DMX mode but no DMX signal is present)
E	Error (repeater thumbwheel is set to an invalid start address)
C	Code (DMX data contains invalid DMX start code)
blank w/non-blinking period	Unit waiting for protocol DMX or VL Comm
blank w/blinking period	Unit receiving VL Comm

Output Ports

The first seven or nine* DMX channels (beginning with the channel corresponding to the start address) control the fixture connected to port #1 on the **Smart Repeater** unit. The second seven or nine* frames control the fixture connected to port #2, and so on. Each **Smart Repeater** unit responds to a maximum of 42 or 54* channels of DMX-512 data whether or not fixtures are connected to all six ports.

* depending on the mode.

Overlapping Data Fields

If two or more **Smart Repeater** units are set to the same thumbwheel address, the fixtures connected to like outputs act the same. If the thumbwheels are set such that data fields overlap, but are offset by a multiple of seven or nine*, then the fixtures connected to like output ports (including the offset) will act the same. If you do not use all six ports on one of the **Smart Repeater** units, you can overlap data fields to conserve DMX channels.

* depending on the mode.

Timing Control

There is no provision for timing information to be encoded as a DMX channel. Timing is controlled by the output of parameter data from the console at the proper time. Motor control software in the luminaire/mirror ensures smooth transitions from one discrete position to the next.

Operating System Download

The **Smart Repeater** unit monitors the **VARI*LITE** fixture's status while in the DMX mode and downloads an operating system (OS) if the fixture requests one. This happens when a new fixture comes on-line or whenever a fixture is reset. The fixture may reset itself and request an OS download in case of a logical error in its processing. The operating system download is always the version which is resident in the **Smart Repeater** unit's EPROM while operating in DMX mode.

Table 2-1. DMX Channel Chart

16-bit DMX Channel	Function In **VL5 / VL5Arc / VL5B** Luminaire
1	Intensity
2	Pan
3	
4	Tilt
5	
6	Blue
7	Amber
8	Magenta
9	Diffuser
10	Intensity
11	Pan
12	
13	Tilt
14	
15	Blue
16	Amber
17	Magenta
18	Diffuser

8-bit DMX Channel	Function In **VL5 / VL5Arc / VL5B** Luminaire
1	Intensity
2	Pan
3	Tilt
4	Blue
5	Amber
6	Magenta
7	Diffuser
8	Intensity
9	Pan
10	Tilt
11	Blue
12	Amber
13	Magenta
14	Diffuser
15	Intensity
16	Pan
17	Tilt

Table 2-1. DMX Channel Chart (continued)

16-bit DMX Channel	Function In **VL5 / VL5Arc / VL5B** Luminaire
19	Intensity
20	Pan
21	
22	Tilt
23	
24	Blue
25	Amber
26	Magenta
27	Diffuser
28	Intensity
29	Pan
30	
31	Tilt
32	
33	Blue
34	Amber
35	Magenta
36	Diffuser
37	Intensity
38	Pan
39	
40	Tilt
41	
42	Blue
43	Amber
44	Magenta
45	Diffuser
46	Intensity
47	Pan
48	
49	Tilt
50	
51	Blue
52	Amber
53	Magenta
54	Diffuser

8-bit DMX Channel	Function In **VL5 / VL5Arc / VL5B** Luminaire
18	Blue
19	Amber
20	Magenta
21	Diffuser
22	Intensity
23	Pan
24	Tilt
25	Blue
26	Amber
27	Magenta
28	Diffuser
29	Intensity
30	Pan
31	Tilt
32	Blue
33	Amber
34	Magenta
35	Diffuser
36	Intensity
37	Pan
38	Tilt
39	Blue
40	Amber
41	Magenta
42	Diffuser

2.3.2 Operating *VL5* Luminaire From a DMX Console

Focus Control

In 8-bit mode, two channels are used for each pan and tilt position control on the **VL5/VL5Arc/VL5B** luminaire. The luminaire is operated most easily using channel faders to control the functions. Use the channel 1 and channel 3 faders for coarse position adjustment of pan and tilt, respectively, and set the channel 2 and channel 4 faders at mid-position to give you fine position adjustment on either side of the coarse position. The first four channel faders set the programmed or static position.

In 16-bit mode, two, 8-bit channels are combined into a single 16-bit channel to produce smoother control. This feature is applicable to a DMX desk which is capable of combining channels. (Refer to the operating manual that accompanies your DMX controller for a more in depth description of this feature.)

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2.4 Installing Accessories

This section provides installation instructions for **VL5/VL5Arc/VL5B** luminaire accessories and mounting equipment. This includes installation of the tophat/gelframe, different types of front glass, the truss hook, and the floor stand.

2.4.1 Tophat/Gelframe

An optional tophat/gelframe is available for use with the **VL5** luminaires. The tophat/gelframe consists of a connected two-piece outer ring and a set of three removable smaller inner rings. The tophat/gelframe may be separated to incorporated circular or square color gels if needed. Three spring loaded clips and a tether cord secure it to the front of the luminaire.

Note: When using the tophat/gelframe, allow an extra 3-1/2 inches per luminaire center-to-center mounting distance to avoid interference between luminaires.

To install tophat/gelframe:

Step 1. At luminaire lens assembly, place tophat/gelframe over lens and secure to cover panels with three spring-loaded clips (**Figure 2-6**).

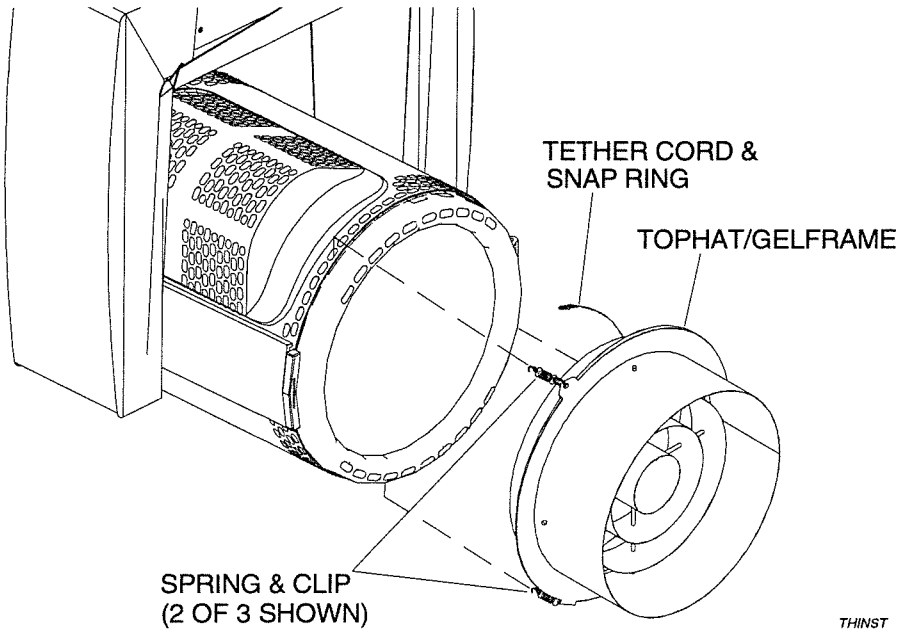

Figure 2-6. Tophat/Gelframe Installation

Step 2. Attach tether cord snap ring to cover panel hole.

To remove inner rings:

Step 1. At tophat/gelframe, remove four hitch pins that secure four inner ring rods to outer weldment (**Figure 2-7**).

Step 2. Push four inner ring rods toward center to clear outer weldment ring. Remove inner rings.

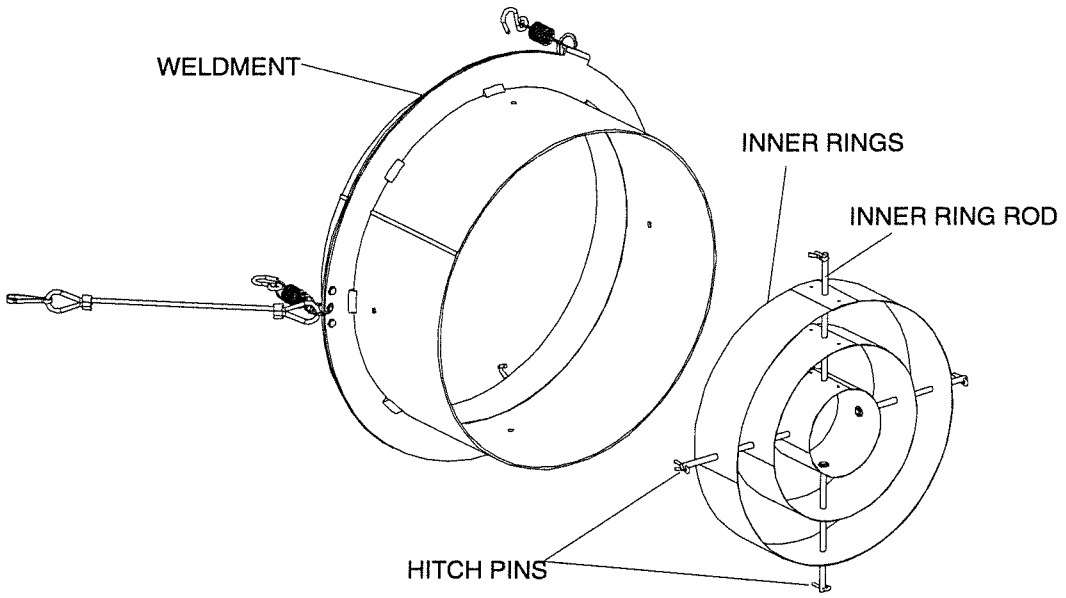

Figure 2-7. Inner Rings Removal

To install color gels:

Step 1. If installed, remove tophat/gelframe from luminaire **(Figure 2-6).**

Step 2. Open two rings and install color gel (**Figure 2-8**). Color gels may be circular (7-5/8 inches to 9-1/4 inches dia.) or square (7-5/8 inches^2 to 9-1/4 inches^2).

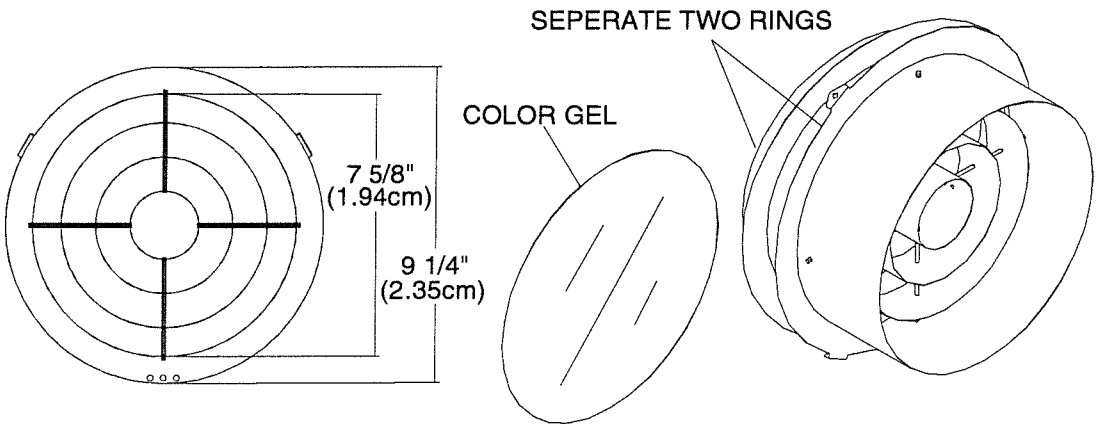

Figure 2-8. Color Gel Installation

2.4.2 Different Types of Front Glass

The interchangeable front glass allows the luminaire beam output to be customized. Refer to Beam Charts section in Chapter 1 for the output variations provided by different types of glass.

Parts:

1 EA GLASS, VL5 FRONT, CLEAR (42-5002-0004), or
1 EA GLASS, VL5 FRONT, STIPPLE (42-5002-0005), or
1 EA GLASS, VL5 FRONT, MED. FLOOD 8ROW LENT. (42-5002-0006), or
1 EA GLASS, VL5 FRONT, MED. FLOOD 10ROW LENT. (42-5002-0007), or
1 EA GLASS, VL5 FRONT, MED. FLOOD 12ROW LENT. (42-5002-0008), or
1 EA GLASS, VL5 FRONT, VERY WIDE FLOOD (BUXOM) (42-5002-0009)

Tools:

None

To remove and replace any style front glass:

Step 1. Remove power to luminaire.

Step 2. At hinge rail front latch, open latch and swing open front ring assembly.

Step 3. At front glass, from outside of front ring, carefully push glass in to disengage glass from front ring pad and remove glass.

Step 4. Place replacement glass against front ring pad, ensuring proper convex or concave orientation for all types of glass and proper parallel alignment of lenticular glasses (**Figure 2-9**).

Lens	Orientation
Clear	Either
Light Stipple	Either
Buxom	Convex
8-Row Lent.	Convex
10-Row Lent.	Convex
12-Row Lent.	Convex

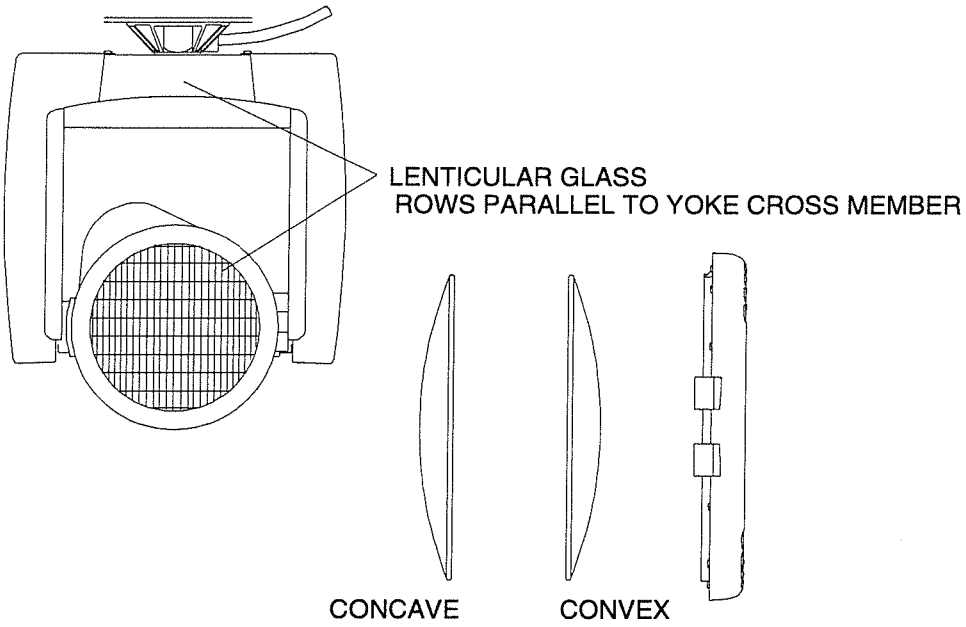

Figure 2-9. Front Lens Orientation

Step 5. Seat bottom portion of glass in pad and gently squeeze down on front ring pad (**Figure 2-10**).

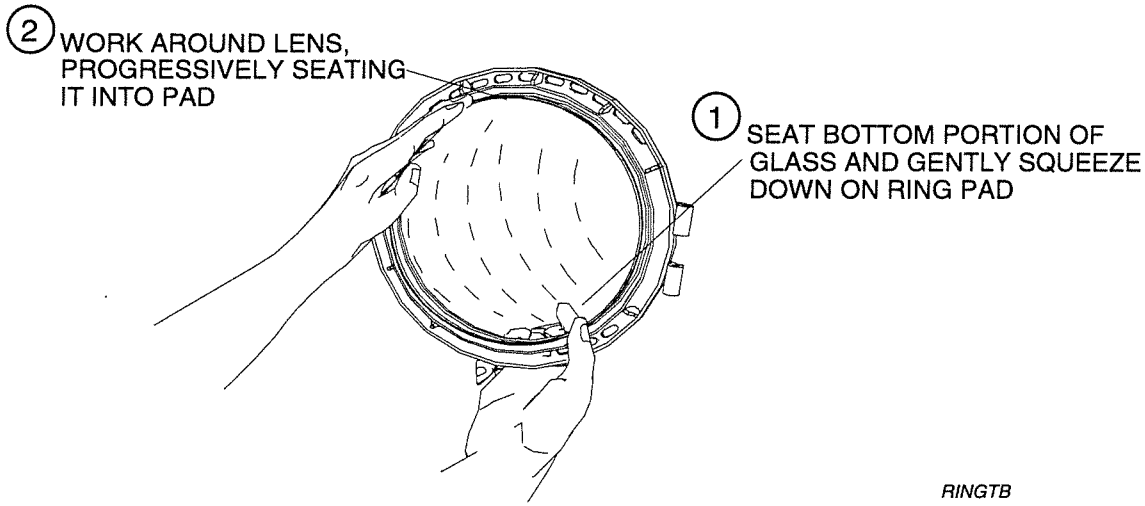

Figure 2-10. Front Glass Replacement

Step 6. After bottom is seated, work fingers around glass, progressively seating it into front ring pad.

Step 7. At latch rail, close front ring assembly and secure latch.

2.4.3 Double Truss Hook

Parts:

1 EA HOOK, VL5 DOUBLE (10-9634-0137)

as needed:

4 EA SCREW, 5/16-18X1" HCSC GRADE 5 (53-7001-0003)
4 EA NUT, 5/16-18 ZINC W/NYLON INSERT (53-2025-0002)
2 EA BOLT, 3/8-16X1-1/2 BLK WING (53-6505-0002)

Tools:

Hand drill or ratchet
Socket, 1/2"

To remove double hook:

Step 1. Remove power to luminaire.

Step 2. Using Makita hand drill equipped with 1/2" socket, loosen four 5/16-18 zinc w/ nylon insert nuts by removing four 5/16-18x1" HCSC screws from base of pan tube and hook. Remove hook. (**Figure 2-11**).

To install double hook:

Step 1. Install double hook by doing Step 2 in reverse. Thread 3/8-16x1-1/2 black wing bolts into mounting holes at top of each upright on hook.

Note: Ensure that input cable is positioned on the right side of pan tube as the hook uprights arc toward you.

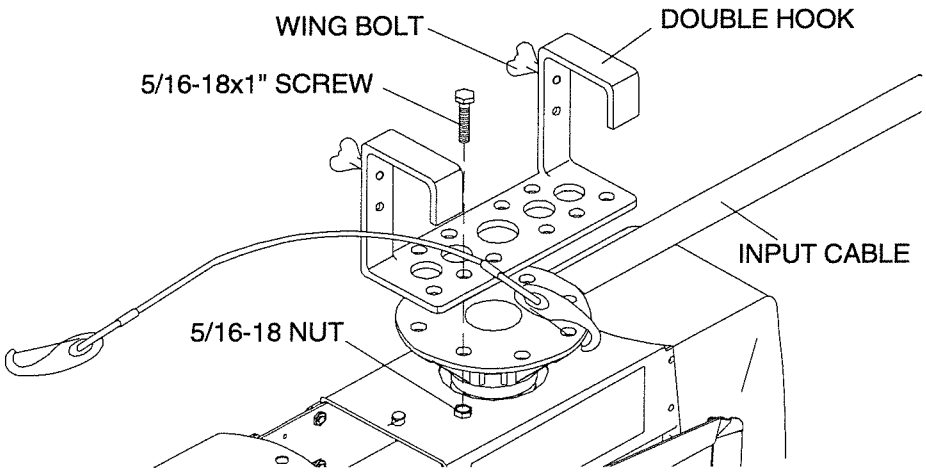

Figure 2-11. Double Truss Hook Removal and Replacement

2.4.4 Floor Stand

An optional floor mounting stand is available for use with the **VL5** luminaires. The floor stand consists of two pivoting and one fixed leg, which provide a tripod floor mount for the luminaire. It is installed in place of the double truss hook.

Parts:

1 EA	FIXED LEG (10-9634-0158)
2 EA	PIVOTING LEG (10-9634-0159)
3 EA	NUT, 5/16-24 (53-2024-0001)
4 EA	NUT, 5/16-18 ZINC W/NYLON INSERT (53-2025-0002)
4 EA	SCREW, 5/16-18 X 1" HCSZ (53-7001-0003)
4 EA	CLUTCH DISC SPRING, VL5 PTM (55-2128-0001)
6 EA	FLAT WASHER, 1/4" ID (55-6631-0001)
1 EA	ROLL PIN, 3/16"OD x 1-1/2"L S/S (55-6692-0002)
3 EA	RUBBER BUMPER, 1-1/2"DIZ. x 1-1/4"W/5/16-24 STUD (55-6696-0001)

Tools:

Ratchet with 1/2 inch socket
Loctite 242

To prepare the legs for installation:

Step 1. Install one rubber bumper on each pivoting leg (at opposite ends) with one 5/16-24 nut. (Pivoting legs are the same until the bumpers are added.) Apply Loctite 242 to the threaded studs and ensure that both nuts are tightened very tight.

Step 2. Install roll pin in fixed leg, ensuring that it is centered (sticking-out an equal distance on either side).

Step 3. Install one rubber bumper on fixed leg with a 5/16-24 nut. (The bumper goes on the end opposite the roll pin.)

To install the legs:

Step 1. Rotate pan tube until input cable is positioned as needed.

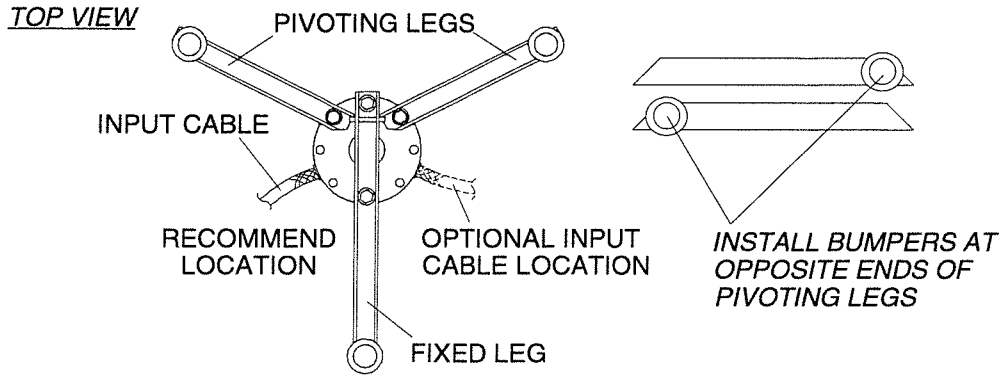

Figure 2-12. Positioning Bumpers and Input Cable

Step 2. Secure fixed leg to pan tube with two 5/16-18 bolts and nuts, and two 1/4"ID flat washers (**Figure 2-13**).

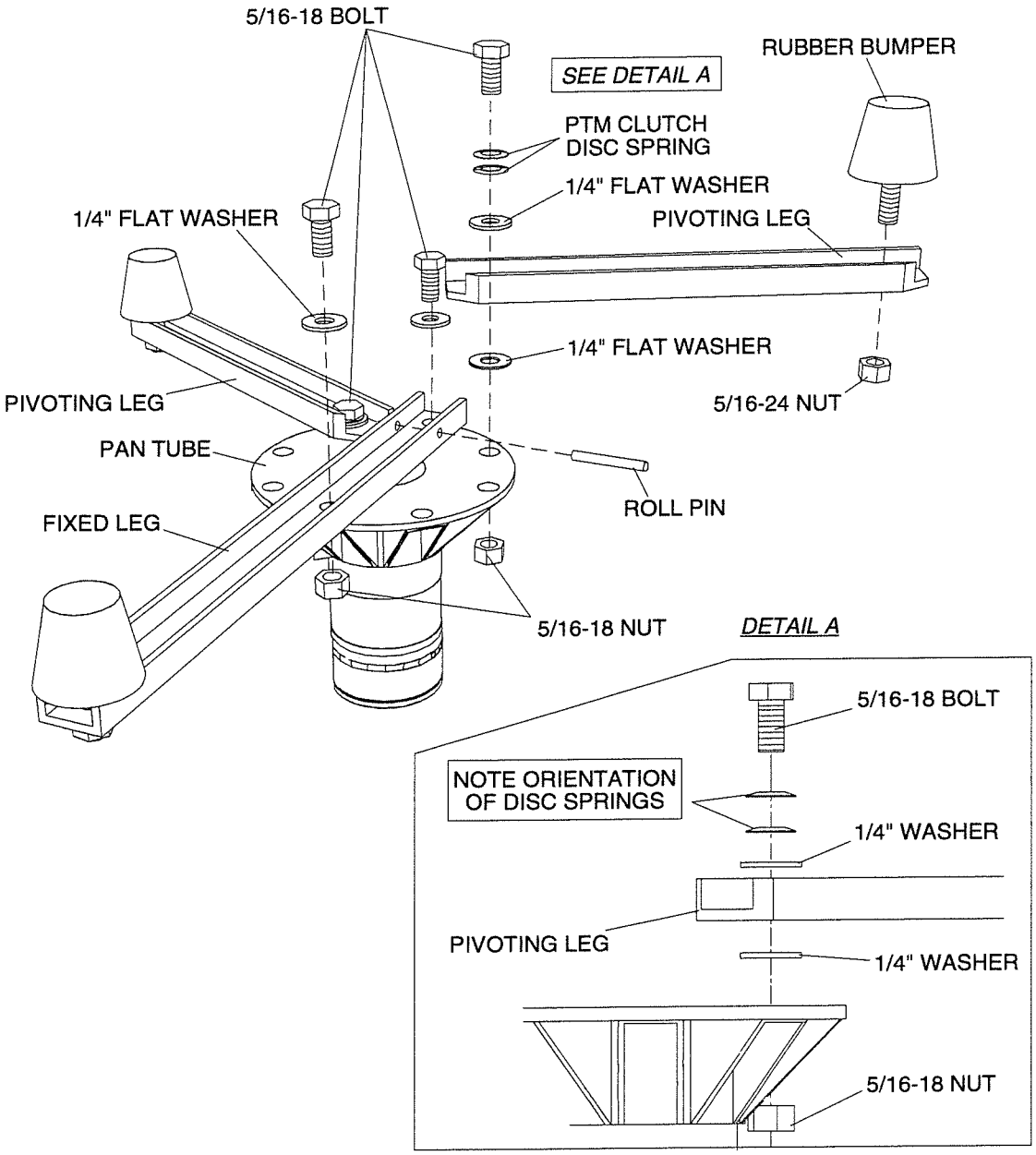

Figure 2-13. Floor Stand Installation

Step 3. Secure pivoting legs to pan tube with, on each leg, one 5/16-18 bolt and nut; with two clutch disc springs, and one 1/4"ID flat washer between the bolt and the leg, one 1/4"ID flat washer between the leg and the pan tube. (Be sure to install disc springs with concave surfaces facing the flat washer as shown.)

Step 4. Using nutdriver, tighten nuts and bolts until proper tension is obtained; just enough so pivoting legs stay where you put them, but not so much that they don't pivot.

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2.5 Operation

2.5.1 Focusing *VL5Arc* Lamp

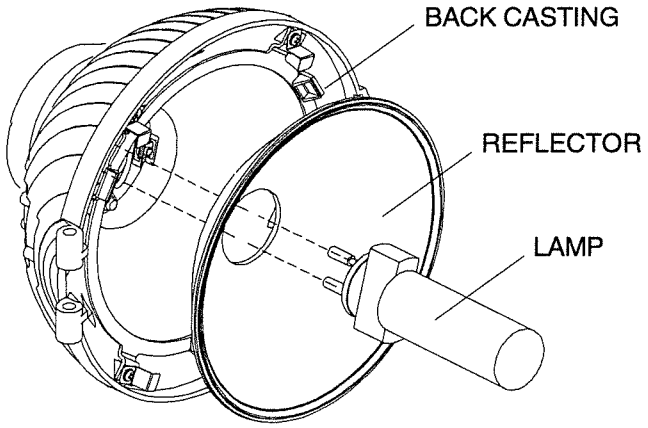
Step 1. At latch rail, open rear latch and swing open heatsink.

CAUTION: Wear gloves or finger cots when handling lamp or reflector.

Step 2. Ensure the following:

a. Reflector is mounted in center of rear casting and secure enough to prevent it from moving. If not, at four reflector mounting clips, loosen four 6-32x3/8"PPSS screws (but do not remove). Center reflector and retighten screws securely.

b. Lamp is plugged into socket firmly and is centered in opening of reflector. Adjust as necessary.



Step 3. Using soft dry cloth, wipe lamp and reflector clean of any dust or fingerprints. Close heatsink and latch.

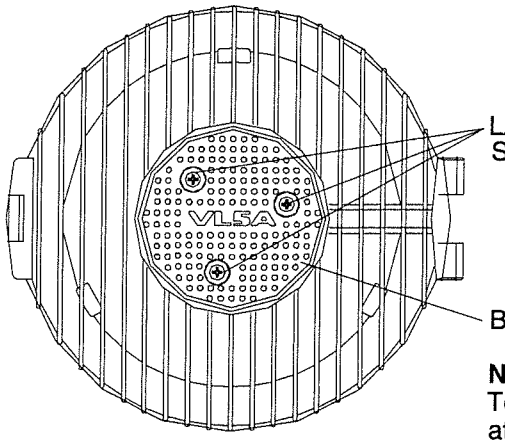
Step 4. Supply power to luminaire. Set color to white and intensity to 100%.

Step 5. At latch rail, open front latch and swing open nose-ring/lens assembly (this will make hot spot and halo easier to see). Shine lamp on flat surface 10-20 feet away.

Step 6. Turn lamp adjustment screws to do the following:

a. Minimize size of halo around hot spot. It will not completely disappear, but should be even and symmetrical all the way around with no large blotches of color at any one point.

b. Maximize spot intensity by making hot spot as small and tightly focused as possible. Hot spot should be centered in halo and in larger brownish circle surrounding it.



Note:
To start all lamp adjustment screws at even point, drive all the way in.

CAUTION: Be careful not to pinch fluid supply hose when closing nose ring/lens assembly.

Step 7. Close nose-ring/lens assembly and latch.

Chapter 3. Maintenance Procedures

This chapter contains the following sections:

3.1 Test Procedures

3.2 Luminaire Fault Isolation

3.3 Luminaire Maintenance Procedures

Periodic Maintenance

Refer to **Series 200** System Equipment Preparation and Inspection Manual (02-3004-0042) for periodic maintenance procedures for new and used equipment.

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3.1 Test Procedures

3.1.1 Luminaire Diagnostic Tests

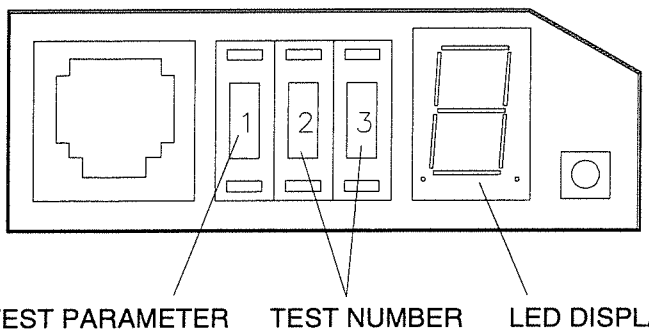
Test software for **Series 300** luminaires resides in the **Smart Repeater** processing unit EPROMs and is downloaded to the luminaire's control board random access memory. The **Smart Repeater** unit must be used to operate the test software since the luminaires do not have individual thumbwheel switches. The unit's seven-segment LED displays test numbers, error codes, and other necessary indications used to test the luminaire.

3.1.2 *Smart Repeater* Unit Operation Overview

Only a brief explanation regarding the operation of the **Smart Repeater** processing unit for the purpose of testing **VL5** luminaires is included in this manual. For complete instructions on **Smart Repeater** operation, refer to ACS Equipment Service Manual (02-9623-0010).

3.1.2.1 Thumbwheel Switch

The thumbwheel switch is used to control operation of the test software. It takes about 3 seconds for the unit to respond to thumbwheel changes, allowing time to punch up the numbers for required test before it tries to read them. Test codes specific to the **VL5** luminaire are given in **Table 3-1** in this chapter. More general types of test codes pertaining to Vari-Lite luminaires can be found in the ACS Equipment Service Manual.



3.1.2.2 Start Test

To enter test mode, remove AC power from **Smart Repeater** unit, set thumbwheel switch to 000, and apply power. The reset tests are performed immediately. If the reset tests fail, the LED display will show three solid bars and the test software will terminate. If the reset tests pass, the LED display will show the message [Sr uP], which means the **Smart Repeater** unit is properly operating. While the **Smart Repeater** unit is doing its reset test, the lamp units receive a new operating system download, reset, and calibrate.

The LED display shows the results of a status poll of all six ports, and indicates whether there are any on-line luminaires connected to any of the ports. A message [P1 F=7] indicates that a on-line lamp unit on Port 1 has a form and function value of 7. If a lamp unit is connected to a port, but is off-line when the test is started, no message is displayed. There are no messages for determining whether anything is connected to any certain port.

When the status poll messages are displayed, the **Smart Repeater** unit is ready to accept a test command.

3.1.2.3 Port Selection

Each **Smart Repeater** unit has six luminaire input/output ports that are labeled 1 through 6. All or only one port can be selected for testing. The default setting for test operations is port 1. To select other ports for testing, set thumbwheel switch to 51, and use the test parameter place on the thumbwheel to select the desired ports: 0 for all ports, 1 through 6 for ports 1 through 6, respectively.

Only the Timer Test, RAM Test, Mechanics Tests, and Form and Function Test can be performed on all ports simultaneously. The Encoder Tests and Data Loopback Test (external form) can be performed only on one port at a time

Programmed tests can be run on all ports simultaneously or on any one port. Port selection is not stored with the program. So, a test can be programmed with only one port selected and the test can be run later with all ports selected, or vice versa.

3.1.3 Test Setup

Step 1. Connect power source to **Smart Repeater** unit as follows:

a. Connect **S200** lamp connector from cheater cable to SERIES 200 INPUT connector. Connect cheater cord plug to wall outlet (110V), or

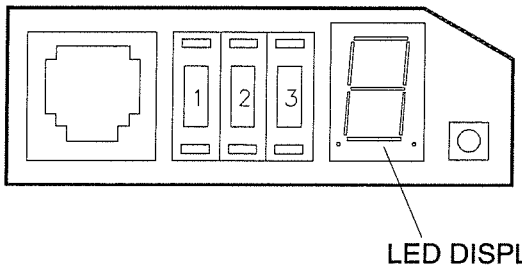
b. Connect **S200** lamp connector from ACS or mini-ACS rack to SERIES 200 INPUT connector.

Step 2. Connect lamp input cable of luminaire to LAMP OUTPUT Port 1.

Note: In the default mode, only Port 1 is selected for test operations, and only the luminaire connected to Port 1 will respond to test commands. Refer to Port Selection paragraph above to set up testing for multiple **VL5** luminaires.

Step 3. Set **Smart Repeater** unit thumbwheel address to 000 and apply power.

Step 4. Check LED display. Display should read [Sr uP], meaning "Smart Repeater Up."



Step 5. Check LED display. Display should read [P1 F=n], which means "Port 1 Form and Function Value=n," which indicates luminaire is on-line at Port 1 (n=7 for the **VL5** luminaire). After connection, the luminaire will go through normal calibration, except for position it is in when it stops.

Step 6. After the **VL5** luminaire calibrates, all motor systems (pan, tilt, color filters and diffuser) are driven to one end-of-travel. Filters are driven open for visibility of all filter banks. Lamp head are pointed up.

Step 7. Referring to **Table 3-1** and test tables given in ACS Equipment Service Manual (02-9623-0010), enter necessary test numbers and parameters to verify proper operation or failure of luminaire functions.

Table 3-1. *VL5* Test Software/Test Tables

Mechanics Tests - *VL5* Luminaires

Test Number		Test Parameter		Error Codes/Comments	
01	PAN	9	END STOP (OPEN)	103	NO RESET (PAN)
02	TILT	8	END STOP (CLSD)	203	NO RESET (TILT)
04	DIFFUSER	7	SPEED 1 (25%)	104	NO CHANGE (PAN)
06	BLUE	6	SPEED 2 (35%)	204	NO CHANGE (TILT)
07	AMBER	5	SPEED 3 (45%)		
08	MAGENTA	4	SPEED 4 (55%)		
		3	SPEED 5 (65%)		
		2	SPEED 6 (75%)		
12	ALL-SYNC	1	SPEED 7 (85%)		
13	ALL-ASYNC	0	SPEED 8 (FULL SPEED)		

Default Test Programs

Test Number		Tests	Functions
31	PAN AND TILT	701	PAN, 25% SPEED
		702	TILT, 25% SPEED
37	VL5 FUNCTIONS	704	EDGE, 25% SPEED
		706	COLOR 1, 25% SPEED
		707	COLOR 2 , 25% SPEED
		708	COLOR 3, 25% SPEED

3.2 Luminaire Fault Isolation

3.2.1 Luminaire Fault Isolation Chart

Assuming that all other system components, including the **Smart Repeater** unit and dimmer are working properly and that proper system power has been supplied to the luminaire:

Symptom	Probable Cause	Corrective Action
No luminaire calibration	Loose input cable connection Loose PTM belt Blown LCB 5A or 1/16A fuse Faulty LCB Faulty lamp input cable	para. 3.2.2.1
Luminaire will not come on-line	Loose LCB connection Faulty LCB Faulty lamp input cable	para. 3.2.2.2
Lamp will not start No *intensity*	Bad lamp Faulty lamp socket/wires Faulty lamp input cable Bad ignitor board (**VL5Arc** only)	para. 3.2.2.3
No tilt response	Loose tilt cable connection Faulty tilt cable Faulty tilt mechanism Faulty LCB	para. 3.2.2.4
Jerky or dragging tilt movement	Loose belt Loose or broken tilt pulley	para. 3.2.2.5
No pan response	Loose pan cable connection Faulty pan cable Faulty pan mechanism Faulty LCB	para. 3.2.2.6
Jerky or dragging pan movement	Loose belt Loose or broken pan pulley	para. 3.2.2.7
No color No diffusion	Dent in head cover Disconnected drive leg link Faulty motor Faulty LCB	para. 3.2.2.8
Wrong color	Incorrect motor-LCB connection Dent in head cover Disconnected drive leg link Faulty motor Faulty LCB	para. 3.2.2.9

3.2.1 Luminaire Fault Isolation Chart (Continued)

Interference between yoke heat shield and head assembly	Improper screw used to mount heat shield	para. 3.2.2.10
Light leaking at rear heat sink seam	Small-sized lamp wire plate	para. 3.2.2.11
No beam control (**VL5Arc**)	Faulty bellows assy Faulty bellows motor Faulty liquid lens	para. 3.2.2.12

3.2.2 Luminaire Fault Isolation Procedures

3.2.2.1 No Luminaire Calibration

Assuming the following:

- Console is powered up and working properly.
- **Smart Repeater** unit is properly connected and working.
- Lamp run extension cable is good.

Step 1. At **VL5** lamp input cable, check connection to lamp run extension cable or to **Smart Repeater** unit. Ensure good connection.

Step 2. Hard reset luminaire by removing and then resupplying power to **Smart Repeater** unit.

Step 3. If symptom persists, remove yoke leg covers. Check belt tension of pan/tilt mechanisms (when the mechanism goes to the end of travel, excess belt slack produces vibration which causes the encoder to continue producing a movement signal to the processor, even though the mechanism is at its stop. The processor never receives the stop and the luminaire will not calibrate).

a. If necessary, slowly increase the belt tension until the vibration is dampened. Refer to Pan/Tilt Belt Tension Adjustment paragraph. (Be careful not to overtighten the belt. Over-tightening will break the small drive pulley.)

Step 4. If symptom persists, at LCB, check red LED indicator for proper operation:

a. Upon receiving power, LED indicator should illuminate steadily for a few seconds.

b. As operating system is downloaded from console, LED indicator should start flashing repeatedly.

Step 5. If symptom persists, at LCB, replace 5A fuses. Refer to LCB 5A Fuse Removal and Replacement paragraph in Chapter 3.

Step 6. If symptom persists, replace LCB 1/16A Fuse. Refer to LCB 1/16A Fuse Removal and Replacement paragraph.

Step 7. If symptom persists, replace LCB. Refer to **VL5** Lamp Control Board Removal and Replacement.

3.2.2.2 Luminaire Will Not Come On-Line

Assuming the following:

- SoftPatch is correct.
- **Smart Repeater** unit is properly connected.
- **Smart Repeater** thumbwheel address for the luminaire is set correctly.

Step 1. Hard reset luminaire by removing and then resupplying power to **Smart Repeater** unit.

Step 2. If symptom persists, remove board-side yoke leg cover. At LCB, check red LED indicator for proper operation:

a. Upon receiving power, LED indicator should illuminate steadily for a few seconds.

b. As operating system is downloaded from console, LED indicator should start flashing repeatedly.

Step 3. At LCB, check all cable connections. Ensure all connections are good.

Step 4. If symptom still persists, replace LCB. Refer to **VL5** Lamp Control Board Removal and Replacement.

3.2.2.3 Lamp Will Not Start / No *Intensity*

Assuming the following:

- Dimmer is properly connected, working, and has not tripped a circuit breaker.
- **Smart Repeater** unit is properly connected.

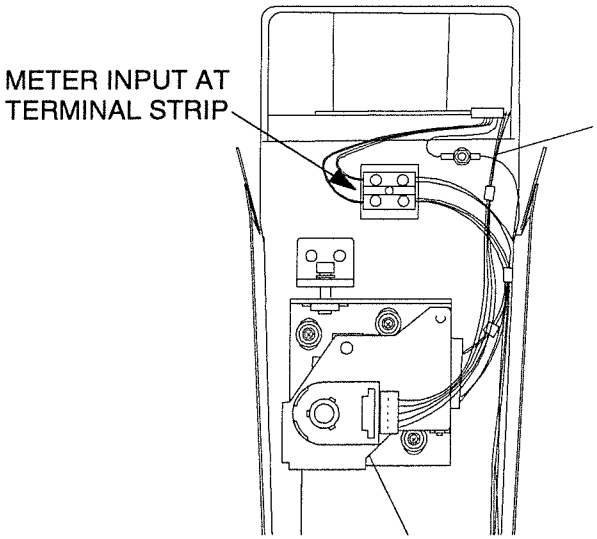
Step 1. Replace lamp. Refer to Lamp Removal and Replacement paragraph.

Step 2. If new lamp will not start, replace lamp socket. Refer to Lamp Socket Removal and Replacement paragraph.

Step 3. If symptom still persists, check continuity of input cable:

a. Remove tilt-side yoke leg cover.

b. Using meter, check continuity of lamp power pins of input cable connector to terminal strip located in yoke leg.



c. Replace pins as needed. Refer to Input Cable Connector Pin Removal and Replacement paragraph.

d. If problem still persists, replace input cable. Refer to Input Cable Removal and Replacement.

3.2.2.4 No Tilt Response

Step 1. At luminaire, remove tilt-side yoke leg cover. At tilt mechanism, check connection of tilt cable. Ensure good connection.

Step 2. Remove board-side yoke leg cover. At LCB, check connection of tilt cable. Ensure good connection. Using meter, check continuity. If cable is bad, then replace. Refer to Tilt Cable Removal and Replacement paragraph.

Step 3. If cable is good, then replace tilt mechanism. Refer to Tilt Mechanism Removal and Replacement.

Step 4. If symptom still persists, replace LCB. Refer to **VL5** Lamp Control Board Removal and Replacement.

3.2.2.5 Jerky or Dragging Tilt Movement

Note: This symptom is usually noticeable during a slow tilt.

Step 1. At luminaire, remove tilt-side yoke leg cover.

Step 2. Check pulley belt for proper tension. Refer to Pan/Tilt Belt Tension Adjustment paragraph.

Step 3. At tilt driven pulley, check for loose or broken pulley. Tighten or replace as needed. Refer to Tilt Driven Pulley Removal and Replacement paragraph.

3.2.2.6 No Pan Response

Step 1. At luminaire, remove board-side yoke leg cover. At pan mechanism, check connection of pan cable. Ensure good connection.

Step 2. At LCB, check connection of pan cable. Ensure good connection. Using meter, check continuity. If cable is bad, then replace. Refer to Pan Cable Removal and Replacement paragraph.

Step 3. If cable is good, then replace pan mechanism. Refer to Pan Mechanism Removal and Replacement.

Step 4. If symptom still persists, replace LCB. Refer to **VL5** Lamp Control Board Removal and Replacement.

3.2.2.7 Jerky or Dragging Pan Movement

Note: This symptom is usually noticeable during a slow pan.

Step 1. At luminaire, remove board-side yoke leg cover.

Step 2. Check pulley belt for proper tension. Refer to Pan/Tilt Belt Tension Adjustment paragraph.

Step 3. At pan driven pulley, check for loose or broken pulley. Tighten or replace as needed. Refer to Pan Driven Pulley Removal and Replacement paragraph.

3.2.2.8 No Color / No Diffusion

For problems with any of the color filters or diffuser panels:

Step 1. At luminaire head, inspect both covers for dents. (Sometimes even small dents in the right place can produce this symptom.) Repair any dents by pressing out with fingers or rubber mallet.

Step 2. If symptom still persists, remove board-side yoke leg cover. Check connection of motor MTA connector to LCB. Ensure connection is good.

Step 3. At linear actuator motor, check connection of drive arm link to swivel link of drive ring. Ensure good connection.

Step 4. At non-working color filter set, check rotation of drive ring. Check for broken or jammed filter.

Step 5. If symptom still persists, replace motor of non-working color filter set. Refer to Linear Actuator Assembly Removal and Replacement.

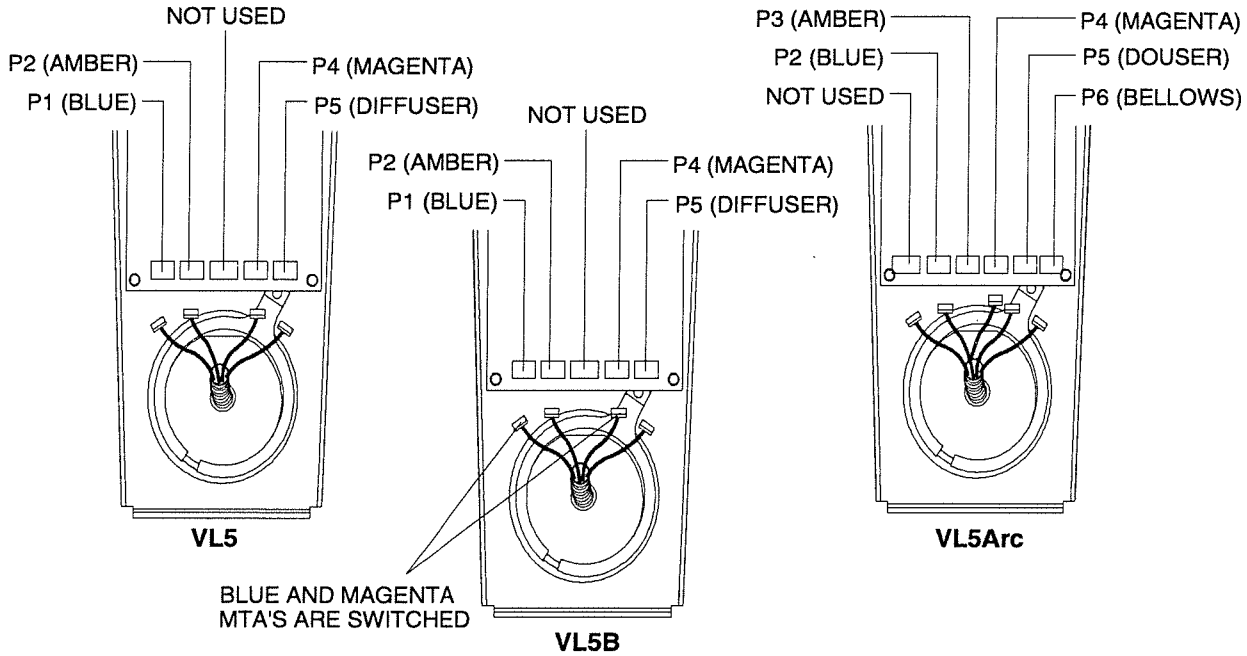
Step 6. If symptom still persists, replace LCB. Refer to **VL5** Lamp Control Board Removal and Replacement.

3.2.2.9 Wrong Color

If control does not manipulate the intended color filter set:

Step 1. At luminaire, remove board-side yoke leg cover.

Step 2. At LCB check connections of motor MTA connectors. Ensure that they are installed in correct positions as shown below. Ensure that MTA connectors are not installed backwards on header. Adjust as necessary.



Step 3. At luminaire head, inspect both covers for dents. (Sometimes even a small dent in the right place can produce this symptom.) Repair any dents.

Step 4. At linear actuator motor, check connection of drive arm link to swivel link of drive ring. Ensure good connection.

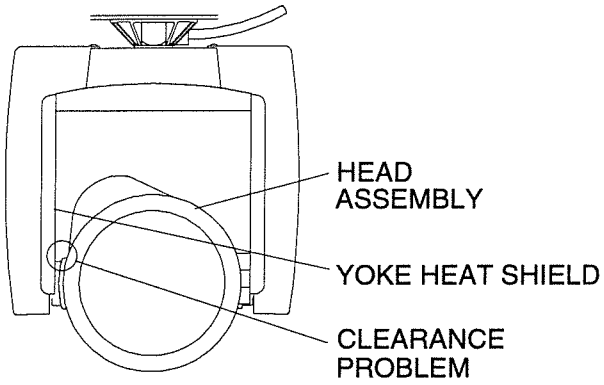
Step 5. At non-working color filter set, check rotation of drive ring. Check for broken or jammed filters.

Step 6. If symptom still persists, replace motor of non-working color filter set. Refer to Linear Actuator Assembly Removal and Replacement.

Step 7. If symptom still persists, replace LCB. Refer to **VL5** Lamp Control Board Removal and Replacement.

3.2.2.10 Interference Between Yoke Heat Shield and Head Assembly

An undetermined number of **VL5** luminaires may have an interference problem between the Yoke Heat Shield and the Head assembly. This interference can be caused by an incorrect screw installed on the Pan/Tilt Stabilizer. The screw that secures the pan/tilt stabilizer has been used to secure the terminal block and vise versa. The screw that should be used on the pan/tilt stabilizer is a 6-32x1/2" PPZ and the screw that secures the terminal block is a 6-32x3/4" PPZ.

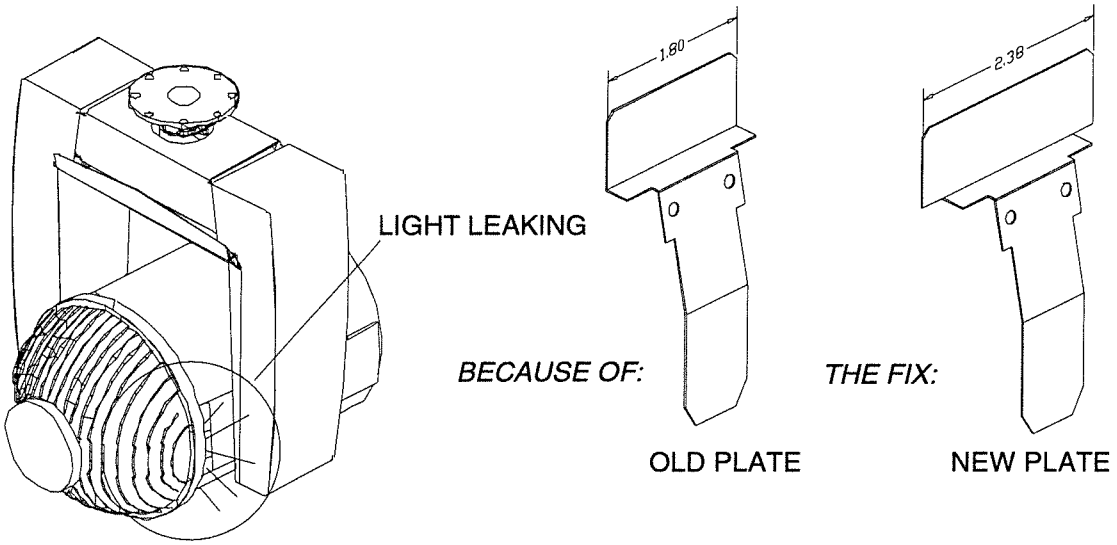


Step 1. Observe location of interference by exercising luminaire in a slow pan and tilt chase. At location, check for bent or damage heat shield or head cover. Repair as needed.

Step 2. If no damage is observed, check for proper heat shield mounting screws. Refer to Correcting Heat Shield Interference paragraph.

3.2.2.11 Light Leaking at Rear Heat Sink Seam

Some **VL5** luminaires may experience light leak due to a smaller sized lamp wire plate. To correct this problem, the small plate can be replaced with a larger version.



Step 1. In low-light environment, increase luminaire intensity to 100%.

Step 2. At position shown in illustration above, check for excessive light leaking. Compare to other **VL5** luminaires if necessary. If light is excessive, replace lamp wire plate with larger version. Refer to Lamp Wire Plate Removal and Replacement paragraph.

3.2.2.12 No Beam Control (*VL5Arc* only)

- Console is powered up and working properly.
- SoftPatch is correct.

Step 1. Check operation of other features such as color change, and pan/tilt.

Step 2. If other features work properly, unlatch and open luminaire nose ring assembly. At liquid lens, check for leak or low fluid. If leaking or low, replace front lens assembly. Contact the appropriate Vari-Lite Support Group for assistance.

Step 3. If liquid seems okay, visually check operation of bellows and motor. If improper or no response to control, replace motor and/or bellows assembly. Contact the appropriate Vari-Lite Support Group for assistance.

3.3 Luminaire Maintenance Procedures

Note: Procedures preceded with a specific luminaire version (**VL5**, **VL5Arc**, and/or **VL5B**) are applicable only to the specified luminaire(s). Procedures without any distinction are applicable to all versions of the luminaire.

3.3.1 Head Assembly Maintenance

3.3.1.1 Installing Front Glass in Tight Fitting Pad

For standard removal and replacement of front glass, refer to Installing **VL5** Accessories section in Chapter 1. For installing front glass in a tight fitting pad, use this procedure.

Note: In early **VL5** luminaires, several different castings for the nose ring have caused slightly different fits for the associated nose ring pads, which hold the front lens in place. The fit differences vary from too loose to too snug. Use the following procedure for tight fitting pads.

To install glass in tight fitting pad:

Step 1. At nose ring pad, apply small amount of Versilube to edge of pad, seating one side of glass into pad (**Figure 3-1**).

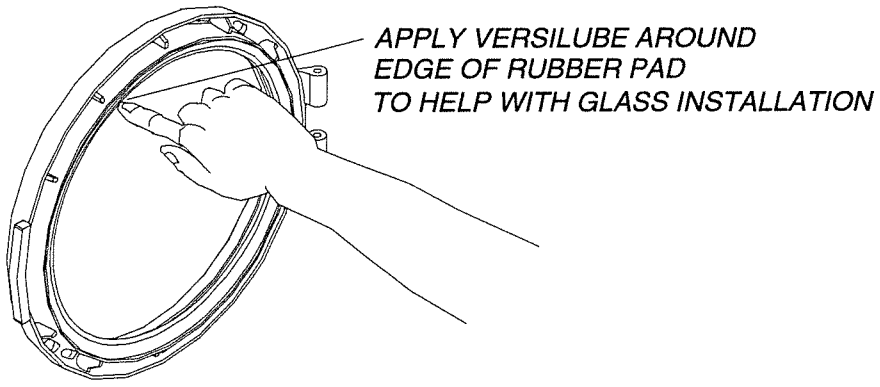


Figure 3-1. Installing Glass in Tight Fitting Nose Ring Pad

Step 2. After bottom is seated, work fingers and Versilube around glass, progressively seating it into front ring pad.

Note: If after applying Versilube, the lens still cannot be easily installed, then the nose ring/pad assembly should be replaced. Refer to Nose Ring Removal and Replacement paragraph.

3.3.1.2 Nose Ring Assembly Removal and Replacement

Parts:

1 EA NOSE RING/PAD ASSEMBLY (22-9634-0164)

Tools:

Hammer
Punch, 1/8 inch

Note: In early **VL5** luminaires, several different castings for the nose ring have caused slightly different fits for the associated nose ring pads, which hold the front lens in place. The nose ring may need to be replaced if the problem is severe.

To remove and replace the nose ring/pad assembly:

Step 1. Remove power to luminaire.

Step 2. At hinge rail front latch, open latch and swing open front ring assembly.

Step 3. At front glass, from outside of front ring, carefully push glass in to disengage glass from front ring pad and remove glass.

Step 4. At hinge pin, identify ungrooved end of hinge pin (**Figure 3-2**).

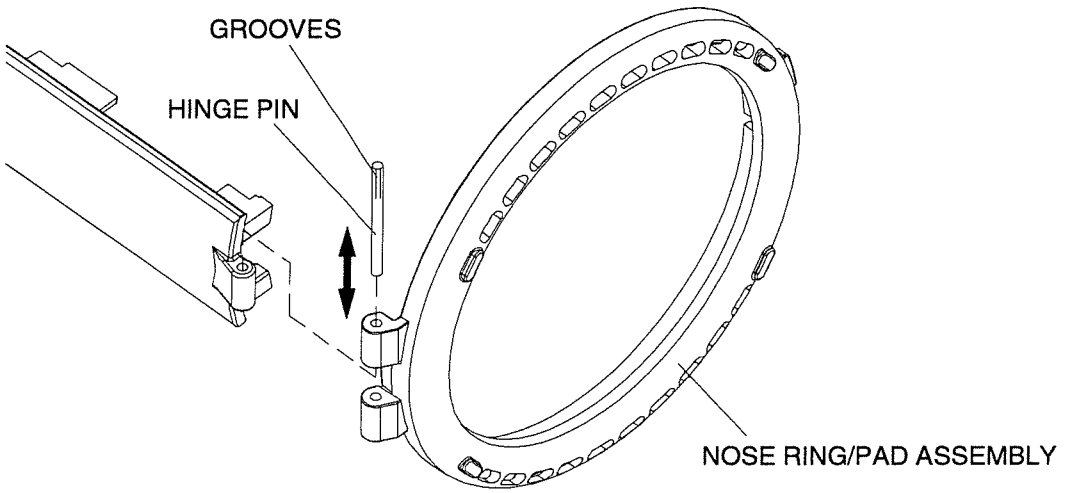


Figure 3-2. Nose Ring/Pad Assembly Removal and Replacement

Step 5. Using hammer and 1/8 inch diameter punch, drive out hinge pin from *ungrooved* end. (Pin *must* be driven out from ungrooved end.)

Step 6. Remove nose ring and replace with new nose ring/pad assembly. Re-install hinge pin by inserting ungrooved end of hinge pin first and carefully hammering into place.

Step 7. Re-install front glass.

3.3.1.3 *VL5/VL5B* Lamp Removal and Replacement

Parts:

1 EA LAMP, VL5 1000 W 100V (Asia), or
1 EA LAMP, VL5 1000 W 120V (U.S.), or
1 EA LAMP, VL5 1000 W 230V (Europe), or
1 EA LAMP, 1200W 120V BLUE PINCH (U.S.)

Tools:

Cotton gloves or finger cots

To replace lamp:

Step 1. Remove power to luminaire.

Step 2. At latch rail, open rear latch and swing open heat sink assembly.

WARNING: Allow hot lamp to cool before removing.

Step 3. At lamp socket, remove lamp (**Figure 3-3**).

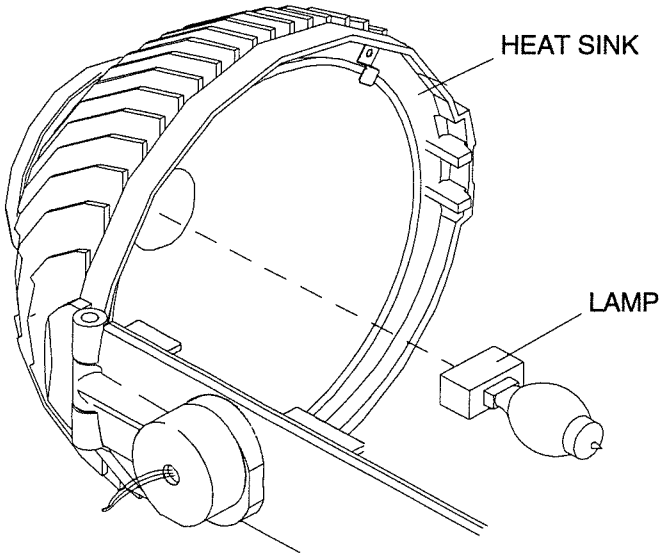


Figure 3-3. *VL5/VL5B* Lamp Removal and Replacement

CAUTION: Wear cotton gloves when handling lamp.

Step 4. Insert new lamp securely into socket.

Step 5. Close and latch heat sink assembly.

3.3.1.4 *VL5Arc* Lamp Removal and Replacement

Parts:

1 EA LAMP, 575 WATT ARC - PHILLIPS MSR575HR

Tools:

Screwdriver, #2 Phillips
Cotton gloves or finger cots

To replace lamp:

Step 1. Remove power to luminaire.

Step 2. At latch rail, open rear latch and swing open heat sink assembly.

CAUTION: Removing a good lamp by pulling on the glass may damage the lamp. To avoid damaging a lamp that will be re-installed, first remove reflector so that lamp may be removed at the base. Wear cotton gloves when handling lamp.

Step 3. Do one of the following:

a. For a bad lamp, remove lamp by pulling out of socket.

b. For a lamp that will be re-installed, go to Step 4.

Step 4. At four reflector mounting clips, loosen 6-32x3/8"PPSS screws (but do not remove), slide clips away from reflector and remove reflector (**Figure 3-4**)..

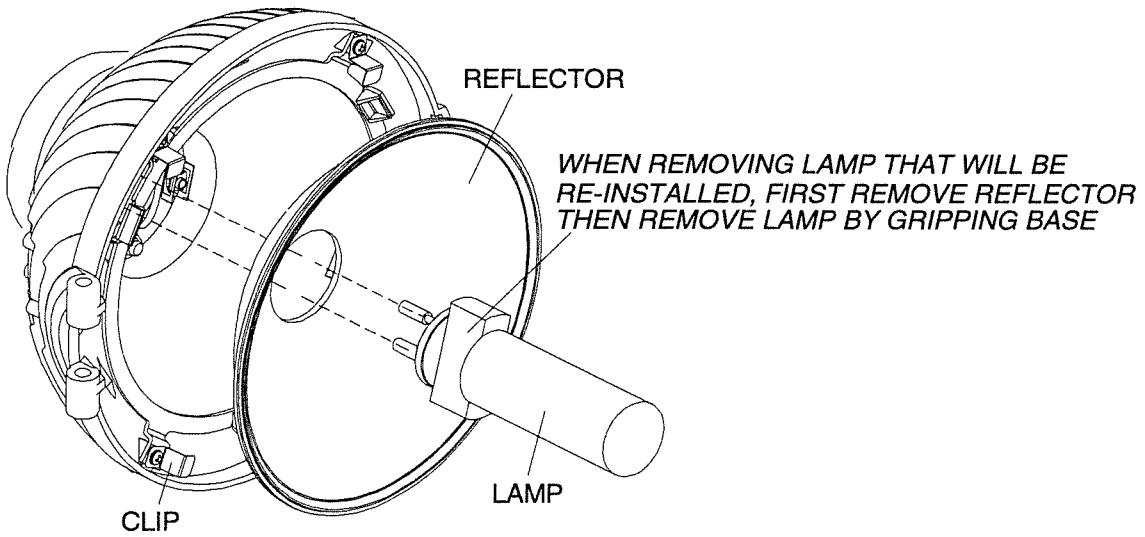

REFLECTOR
WHEN REMOVING LAMP THAT WILL BE RE-INSTALLED, FIRST REMOVE REFLECTOR THEN REMOVE LAMP BY GRIPPING BASE
LAMP
CLIP

Figure 3-4. *VL5Arc* Lamp Removal and Replacement

Step 4. At lamp socket, remove lamp by gripping base and pulling out of socket.

Step 5. Replace lamp by doing steps 2 thru 4 in reverse.

3.3.1.5 *VL5/VL5B* Lamp Socket Removal and Replacement

Parts:

1 EA SOCKET, LAMP, VL5 (71-9634-0132)
1 EA RECEPT.MAT100 W/TAB RED 2 POS. (52-6396-2202)
1 EA COVER, STRAIN RELIEF/2POS MTA (52-6424-0002)
2 EA CABLE TIE, SMALL .10X4" (55-2186-0001)

as needed:

1 FT SLEEVING, FIBERGLASS (55-2260-0106)

Tools:

Screwdriver, Phillips #2
Screwdriver, slotted #1
Hook and pick tool
Diagonal cutters
Loctite PST 567
MTA crimp gun
Scissors (for cutting sleeving)
Cotton gloves or finger cots

To remove and replace lamp socket:

Step 1. Remove power to luminaire.

Step 2. At tilt-side leg, remove yoke leg cover.

Step 3. Using diagonal cutters, remove two tie wraps securing lamp and ground wires to yoke leg (**Figure 3-5**).

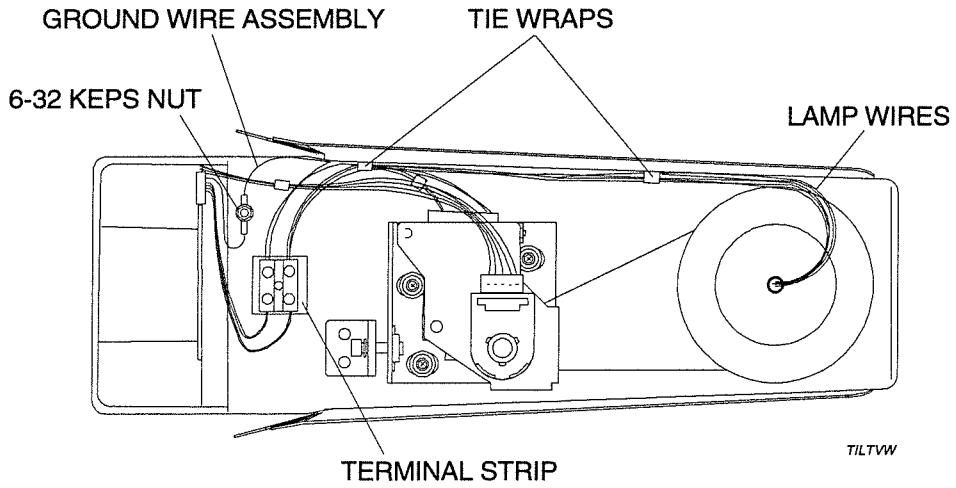


Figure 3-5. Disconnecting Lamp and Ground Wires

Step 4. At terminal strip, using #1 slotted screwdriver, disconnect two lamp socket wires.

Step 5. At threaded stud, using 5/16 inch nutdriver, remove 6-32 KEPS nut securing ring terminal of green ground wires assembly. Remove ring terminal from stud.

Step 6. At latch rail, open rear latch and swing open heat sink assembly.

CAUTION: Wear cotton gloves when handling lamp.

Step 7. At lamp socket, remove lamp (**Figure 3-6**).

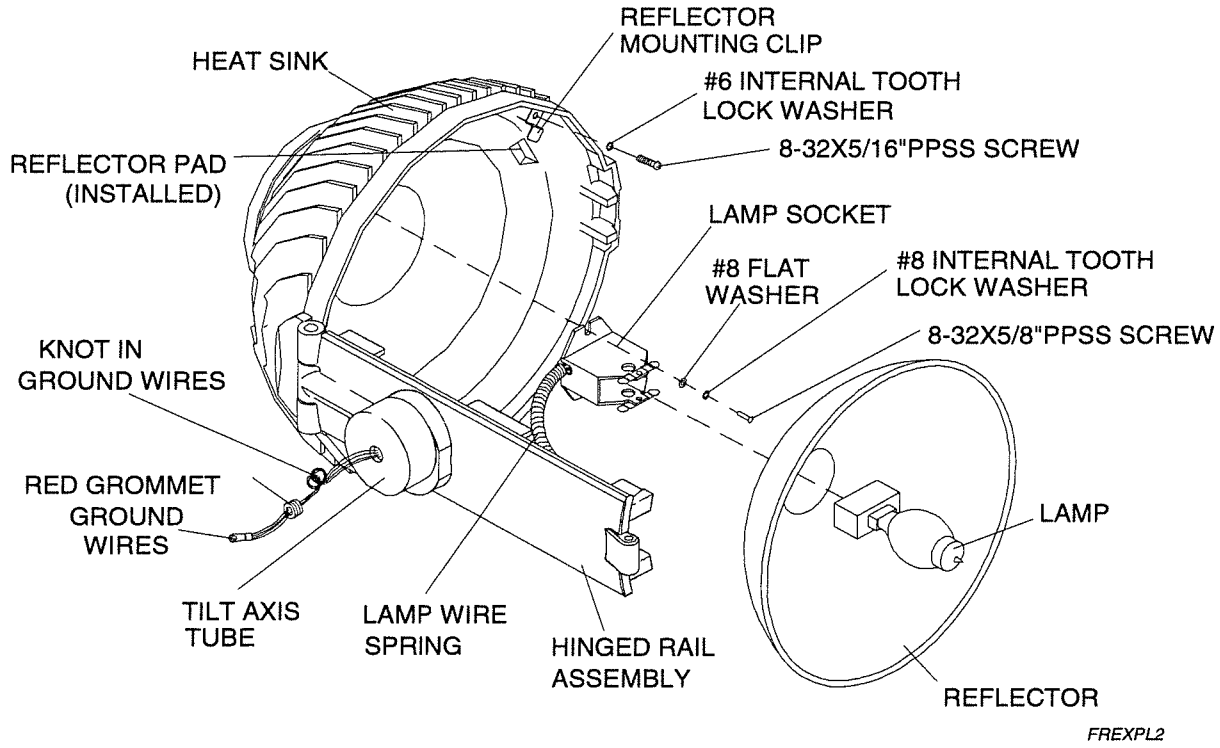


Figure 3-6. Lamp Socket Removal and Replacement

Step 8. At four reflector mounting clips, loosen 6-32x5/16"PPSS screws (but do not remove), slide clips away from reflector, and remove reflector.

Step 9. At lamp socket, remove two 8-32x3/8"PPSS screws, two #8 internal tooth lock washers, and two #8 flat washers that secure socket to heat sink cap and remove socket.

Step 10. At lamp wire spring, pull out lamp wires, removing socket and wires from luminaire.

Step 11. If present, remove fiberglass sleeving from lamp wires. (This will be installed on new socket.)

CAUTION: Fiberglass sleeving must be installed on lamp wires. If not present on old lamp wires, order sleeving and install on new wires before installing socket in luminaire.

Step 12. Install fiberglass sleeving on new lamp wires:

a. Note orientation of lamp wires as they extend out of bottom portion of lamp socket (**Figure 3-7**).

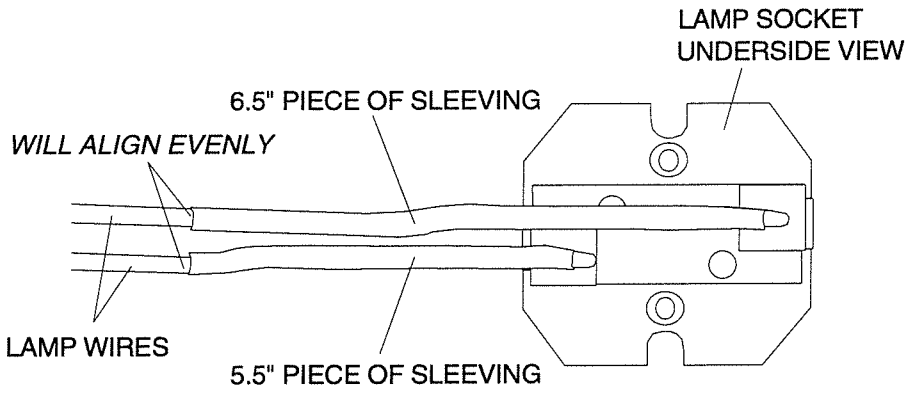


Figure 3-7. Installing Fiberglass Sleeving on Lamp Wires

b. Install 6.5" piece of sleeving on wire which passes under socket base. Install 5.5" piece on remaining wire. (This will allow both pieces of sleeving to align evenly when socket is installed.)

c. Push sleeving onto wires until it is flush with metal base of socket, fully covering wires as they extend out of socket.

Step 13. At luminaire, at tilt axis tube, slide out red grommet onto green ground wires (**Figure 3-8**).

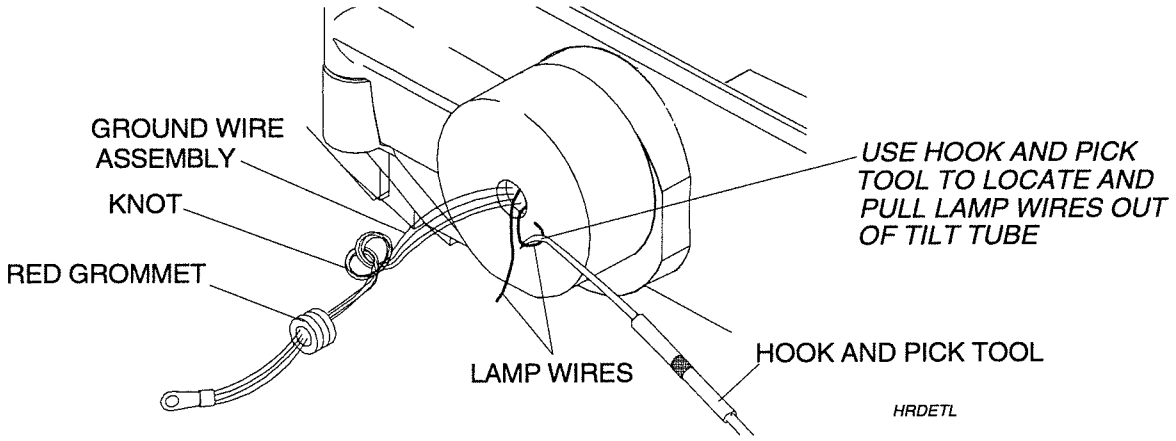

GROUND WIRE ASSEMBLY
KNOT
RED GROMMET
USE HOOK AND PICK TOOL TO LOCATE AND PULL LAMP WIRES OUT OF TILT TUBE
LAMP WIRES
HOOK AND PICK TOOL
HRDETL

Figure 3-8. Replacing Lamp Wires in Tilt Axis Tube

Step 14. At green ground wires, pull knot in wires out of tilt axis tube.

Hint: Pull ground wires as far as possible away from tilt axis tube (do not tug hard). This makes it easier to feed new lamp wires through lamp wire spring.

Step 15. At hinged rail, separately feed lamp wires into lamp wire spring.

a. Push wires thru and use hook and pick tool to grab end of wires when visible in tilt axis tube and pull thru hole.

b. Fiberglass sleeving should extend into spring at least 1/2 inch.

Step 16. Secure lamp socket to heat sink cap:

a. Position socket so that longer wire passes under socket toward lamp wire spring (**Figure 3-7**).

b. Using two 8-32x3/8"PPSS screws, two #8 internal tooth lock washers, and two #8 flat washer, secure socket in place (**Figure 3-6**). Apply Loctite PST 567 to each screw.

CAUTION: Improper tightening of retaining clips may cause reflector to crack. Ensure that tabs on back of reflector are fully seated in rubber pads of heatsink before tightening.

Step 17. Re-install reflector in heat sink assembly, ensuring that tabs on back of reflector are properly seated (**Figure 3-9**). Slide retaining clips over reflector and tighten four 6-32x5/16"PPSS screws on mounting clips in diagonal or cross pattern (do not tighten screws in circular pattern).

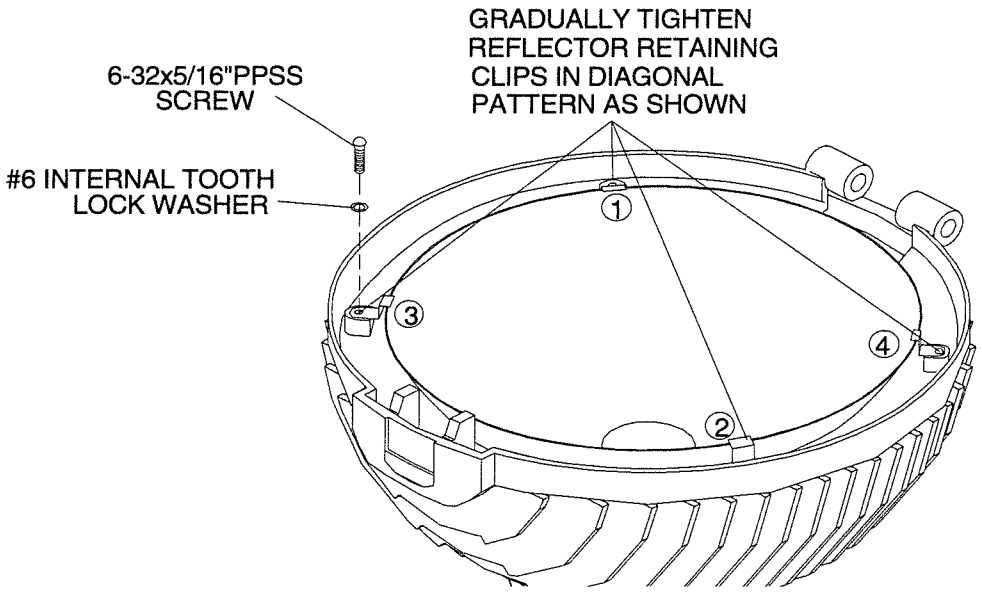


Figure 3-9. Re-installing Reflector in Heat Sink Assembly

Step 18. Install lamp in socket.

Step 19. Close and latch heat sink.

CAUTION: **VL5** luminaire lamp wires must be dressed by the following method. Failure to dress the lamp wires properly will result significantly

lower lamp wire life. The main objective to dressing the lamp wires is to prevent the wires from twisting inside the tilt tube grommet.

Step 20. Position luminaire with lens flat on work surface and yoke pushed toward top lamp cover side (**Figure 3-10**).

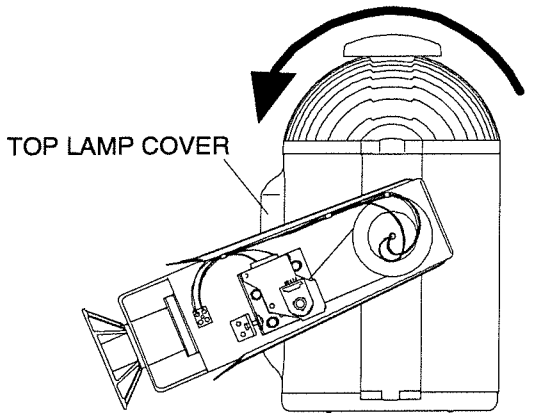


Figure 3-10. Positioning Yoke for Wire Dressing

Step 21. Pull green ground wires taut. Knot in ground wires should be about 1/2 inch away from tilt axis tube. (Do not pass knot through red grommet.)

Step 22. Pass both lamp wires through red grommet.

Step 23. Feed knot of ground wires thru hole, back into tilt axis tube.

Step 24. Re-install red grommet in tilt axis tube hole.

a. Use hook and pick tool to work inner lip of grommet in circular manner into hole in tilt axis tube. Then make bottom of outer lip flush with tilt axis tube.

Step 25. At terminal strip, using #1 slotted screwdriver, reconnect two lamp socket wires. (Refer back to **Figure 3-5**.)

Step 26. At threaded stud, using nutdriver, re-install ring terminal of green ground wire assembly with 6-32 KEPS nut.

Step 27. Dress and secure lamp wires:

a. At tilt tube grommet, pull excess lamp wire length thru tilt tube grommet. Group lamp wires and ground wires together (**Figure 3-11**).

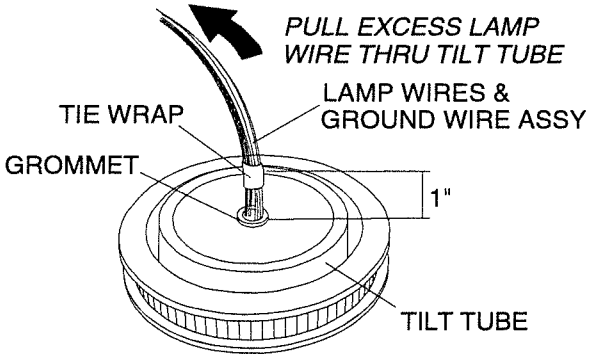


Figure 3-11. Dressing Lamp and Ground Wires

b. With wires slightly twisted together, install a small tie wrap around wires approximately one inch from grommet.

c. With head assembly positioned as shown in **Figure 3-12-** *View A*, twist wires in a clockwise direction until the wires form a loop.

d. Install a small cable tie around wires approximately six inches from grommet.

e. Secure lamp wires to yoke leg cable anchors with two small tie wraps.

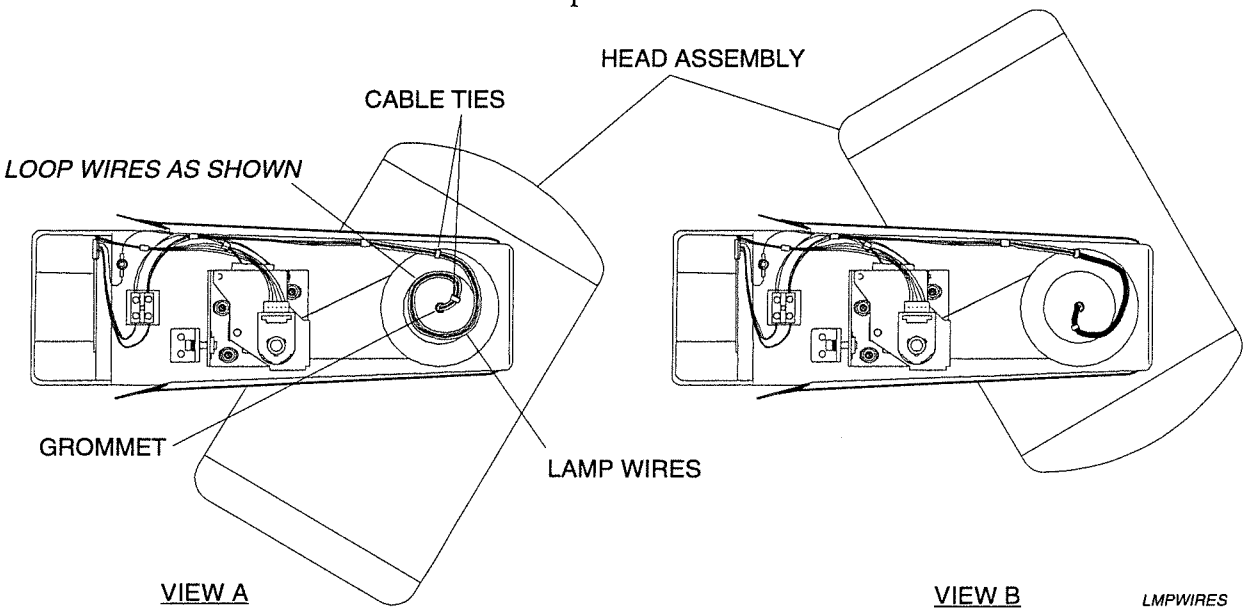


Figure 3-12. Creating Service Loop in Lamp Wires

Step 28. Rotate head assembly to ensure wires coil and uncoil smoothly.

Step 29. Re-install yoke leg cover on tilt-side leg.

3.3.1.6 *VL5Arc* Lamp Socket Removal and Replacement

Parts:

1 EA ASSY, VL5Arc LAMP SOCKET (22-9647-0010)

Tools:

Screwdriver, Phillips #2
Screwdriver, Phillips #1
Cotton gloves or finger cots

To remove and replace *VL5Arc* lamp socket:

Step 1. Remove power to luminaire.

Step 2. At latch rail, open rear latch and swing open heat sink assembly.

CAUTION: Removing a good lamp by pulling on the glass may damage the lamp. To avoid damaging a lamp that will be re-installed, first remove reflector so that lamp may be removed at the base. Wear cotton gloves when handling lamp.

Step 3. At four reflector mounting clips, loosen 6-32x3/8"PPSS screws (but do not remove), slide clips away from reflector and remove reflector (**Figure 3-13**)..

Step 4. At lamp socket, remove lamp.

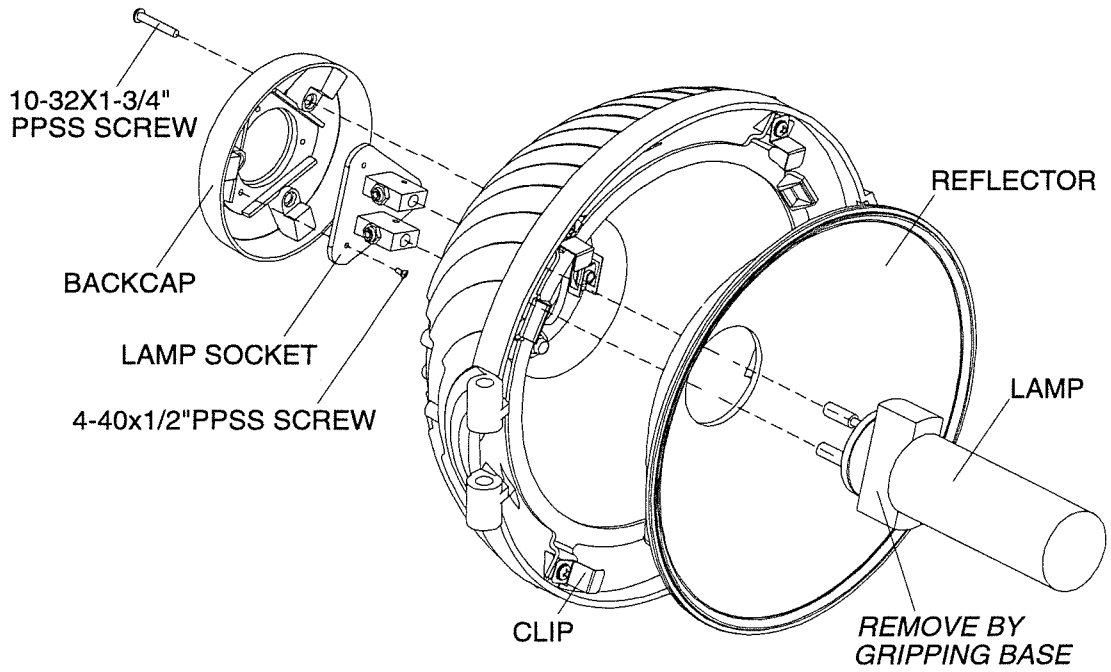


Figure 3-13. *VL5Arc* Lamp Socket Removal and Replacement

Step 5. At lamp socket, remove three 4-40x1/2"PPSS screws that secure socket to heat sink cap.

Step 6. At rear of heatsink assembly, remove three 10-32x1-3/4"PPSS screws that secure back cap to heatsink assembly.

Step 7. At lamp socket, using #1 Phillips screwdriver, loosen two 6-32x1/4"PPB screws that secure lamp wires to socket. Remove socket.

CAUTION: Do not overtighten 6-32x1/4"PPB screws when re-installing. Tighten slowly to prevent brass screwheads from breaking.

Step 8. Replace lamp socket by doing steps 2 thru 7 in reverse. Ensure proper orientation of backcap when re-installing (**Figure 3-14).**

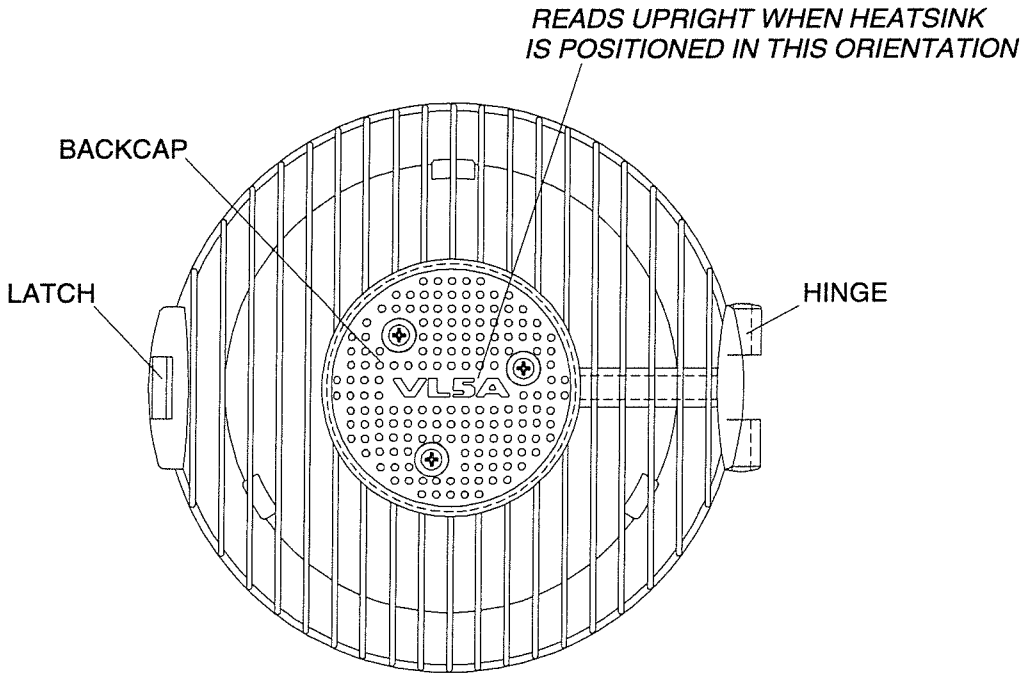


Figure 3-14. *VL5Arc* BackCap Orientation

3.3.1.7 *VL5Arc* Lamp Wires Removal and Replacement

Parts:

1 EA CABLE ASSY, VL5Arc BULB WIRES (25-9647-0059)

Tools:

Screwdriver, Phillips #2
Screwdriver, Phillips #1
Cotton gloves or finger cots

To remove and replace lamp wires:

Step 1. Remove power to luminaire.

Step 2. At latch rail, open rear latch and swing open heat sink assembly.

CAUTION: Removing a good lamp by pulling on the glass may damage the lamp. To avoid damaging a lamp that will be re-installed, first remove reflector so that lamp may be removed at the base. Wear cotton gloves when handling lamp.

Step 3. At four reflector mounting clips, loosen 6-32x3/8"PPSS screws (but do not remove), slide clips away from reflector and remove reflector (**Figure 3-13**)..

Step 4. At lamp socket, remove lamp.

Step 5. At lamp socket, remove three 4-40x1/2"PPSS screws that secure socket to heat sink cap.

Step 6. At rear of heatsink assembly, remove three 10-32x1-3/4"PPSS screws that secure back cap to heatsink assembly.

Step 7. At lamp socket, using #1 Phillips screwdriver, loosen two 6-32x1/4"PPB screws that secure lamp wires to socket. Pull lamp wires out of socket (**Figure 3-15**).

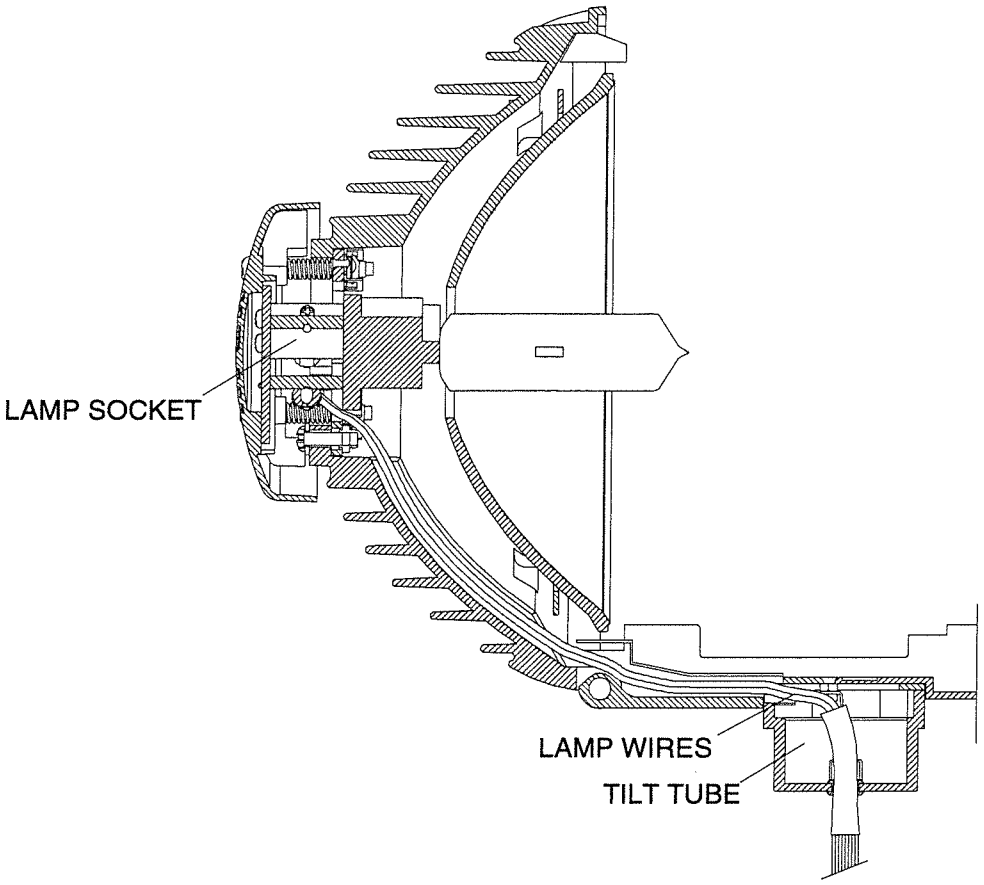


Figure 3-15. *VL5Arc* Lamp Wires Cutaway View

Step 8. At ignitor board, disconnect 3-pos. connector housing from lamp wires. (It may be necessary to remove ignitor board from cross member to access connector. Refer to **VL5Arc** Ignitor Board Removal and Replacement.). Pull lamp wires thru hinged rail and out of tilt tube.

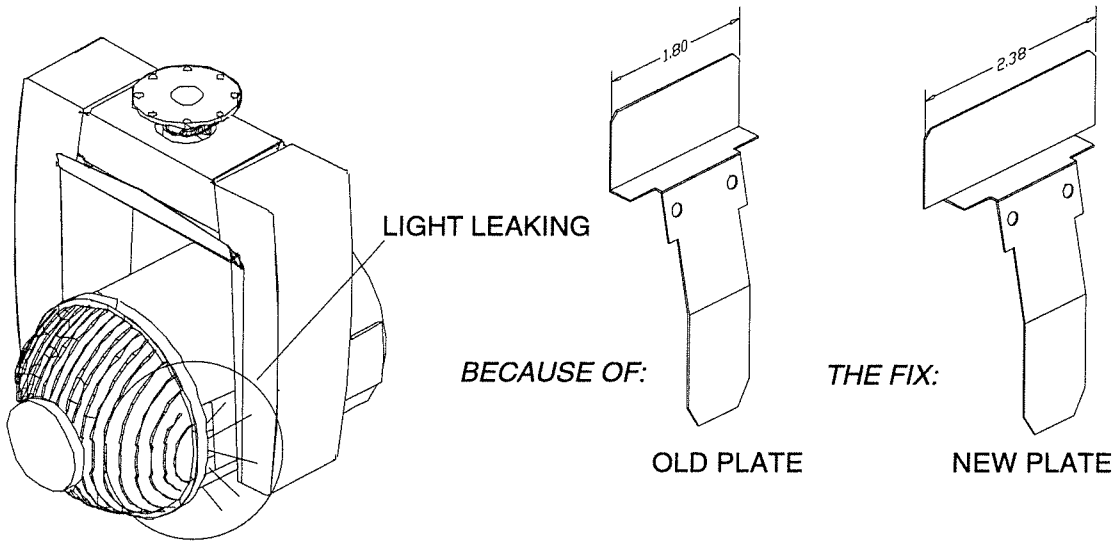
Step 9. Insert loose end of replacement bulb wires into tilt tube. Feed thru tilt tube and hinge rail. Pull slack thru.

Step 10. Strip end of replacement lamp wires to a length of 1/4". Insert stripped end of each lamp wire into socket wire holes. Tighten two 6-32x1/4"PPB screws to secure in place.

Step 11. Re-assemble luminaire by doing steps 2 thru 6 in reverse. Ensure proper orientation of backcap when re-installing (**Figure 3-14**).

3.3.1.8 Lamp Wire Plate Removal and Replacement

Note: Some **VL5** luminaires may experience light leak due to a smaller sized lamp wire plate. To correct this problem, the small plate can be replaced with a larger version.



Parts:

1 EA PLATE, LAMP WIRE (10-9634-0135)

Tools:

Screwdriver, #2 Phillips
Screwdriver, #1 Phillips

To replace lamp wire plate:

Step 1. Remove power from luminaire.

Step 2. Remove both yoke leg covers.

Step 3. At board-side yoke leg, disconnect four 4-pin linear actuator MTA connectors at LCB headers marked P1, P2, P4, and P5 (**Figure 3-16**).

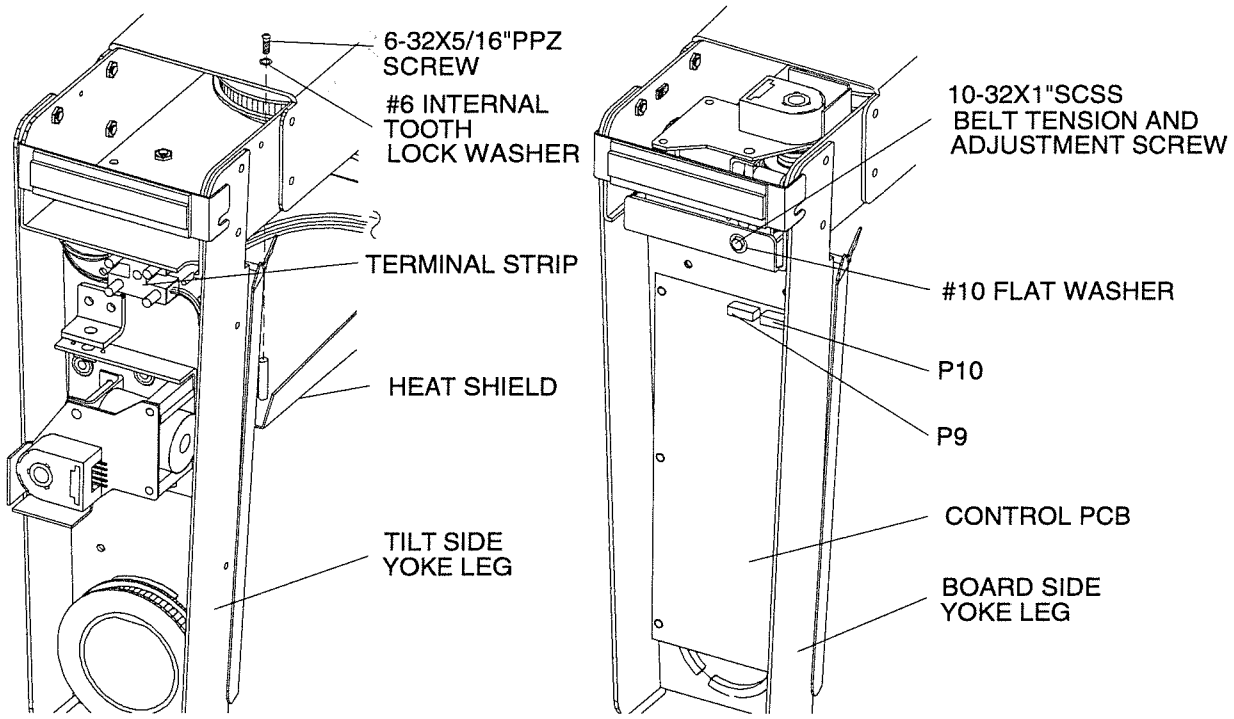


Figure 3-16. Disconnecting Pan Mechanism Wires

Step 4. Using screwdriver, remove 6-32X1/2"PPZ screw securing stabilizer assembly to yoke leg. Remove stabilizer.

Step 5. Remove tilt tube cap from tilt tube.

Step 6. At top yoke cross member, remove four 6-32x5/16"PPSS screws that secure heat shield to yoke cross member and remove heat shield.

Step 7. At board-side yoke leg, at corner of cross member, loosen, but do not remove, 8-32x3/8"PPSS screw on each side of yoke leg closest to pan tube (**Figure 3-17**).

Step 8. Loosen and remove four remaining 8-32x3/8"PPSS screws (two on each side) on yoke leg that secures leg to cross member. Yoke cover bracket, if installed, may come off when screws that secure it are loosened.

Step 9. At bottom of cross member, remove two 8-32x3/8"PPSS screws that secure yoke leg to cross member and pivot leg away from luminaire head.

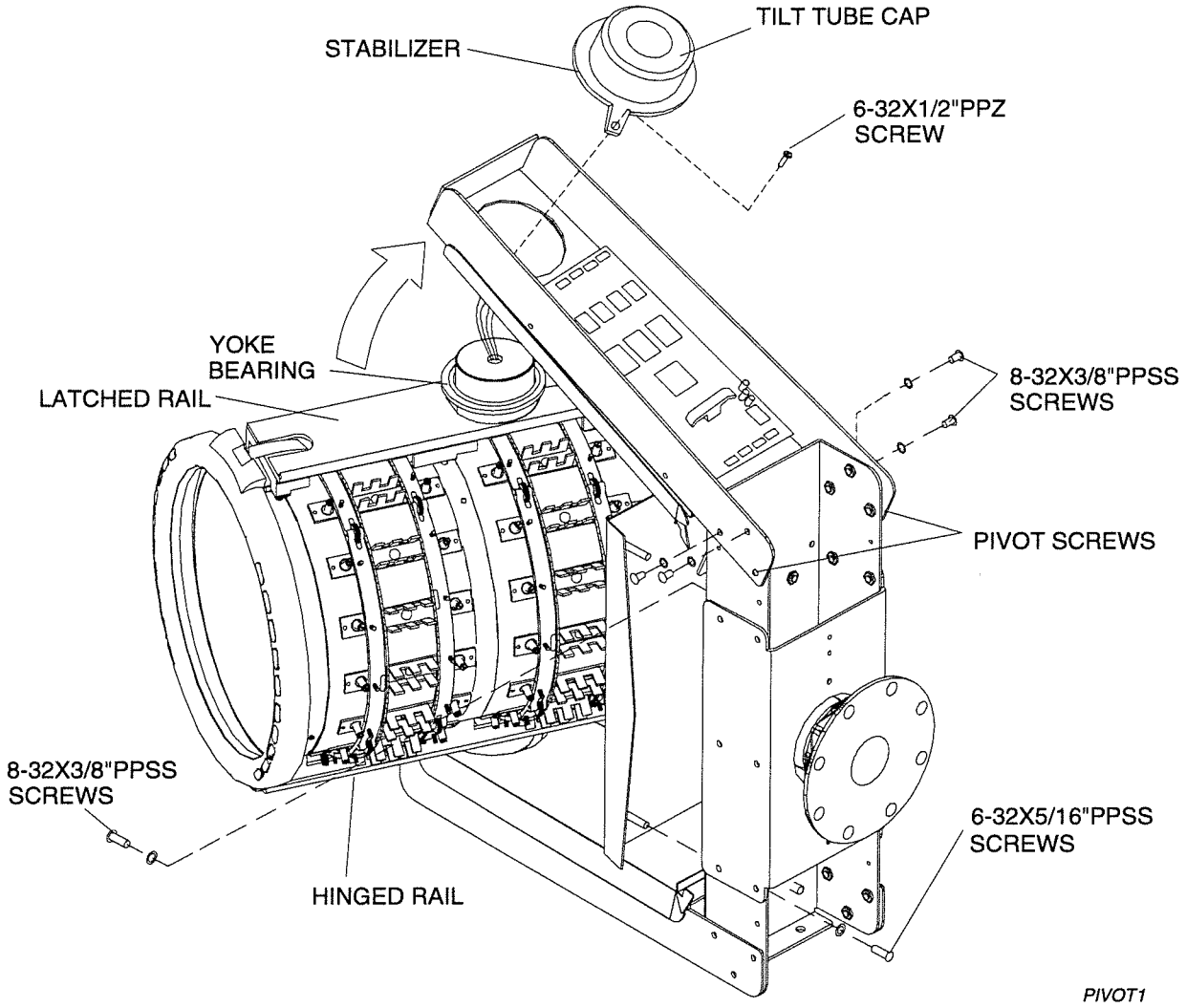


Figure 3-17. VL5 Luminaire Yoke Leg Pivot

Step 10. At latched rail, open both latches and swing open front ring assembly and heat sink assembly.

Step 11. Remove top and bottom head covers.

Step 12. At heat sink assembly, remove lamp.

Step 13. At each end of hinged rail, inside head assembly, remove two 6-32x3/8"PPSS screws and #6 internal tooth lock washers that secure rail to head assembly. Remove luminaire head from hinged rail.

Step 14. At hinged rail, remove two 4-40x1/4"PPZ screws (55-2203-0001) and two #4 internal tooth lockwashers (55-3303-0004) securing lamp wire plate to hinged rail. Remove lamp wire plate (**Figure 3-18**).

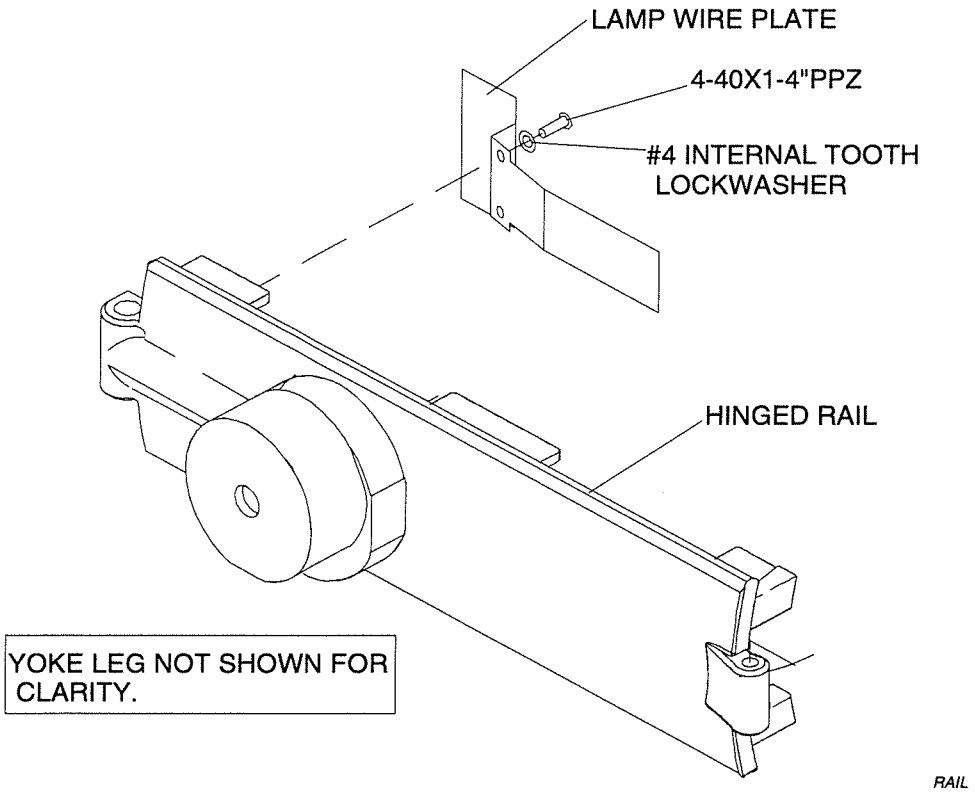


Figure 3-18. Lamp Wire Plate Removal and Installation.

Step 15. Secure new lamp wire plate (10-9634-0135) to hinged rail using two 4-40x1/4″PPZ screws and two #4 internal tooth lockwashers.

Step 16. Re-assemble luminaire by doing steps 2 thru 13 in reverse.

3.3.1.9 Separating Front and Rear Bulkheads

Note: This procedure is necessary when accessing some color filter assemblies and when replacing drive ring pins.

Tools:

Screwdriver, Phillips #2
Screwdriver, Phillips #1
Diagonal cutters
Nutdriver, 5/16 inch
Wrench, Allen, 9/16 inch
Wrench, Allen, 5/32 inch

To separate bulkheads:

Step 1. Remove power to luminaire.

Step 2. Remove both yoke leg covers.

Step 3. At board-side yoke leg, disconnect four 4-pin linear actuator MTA connectors at PCB headers marked P1, P2, P4, and P5 (**Figure 3-19**).

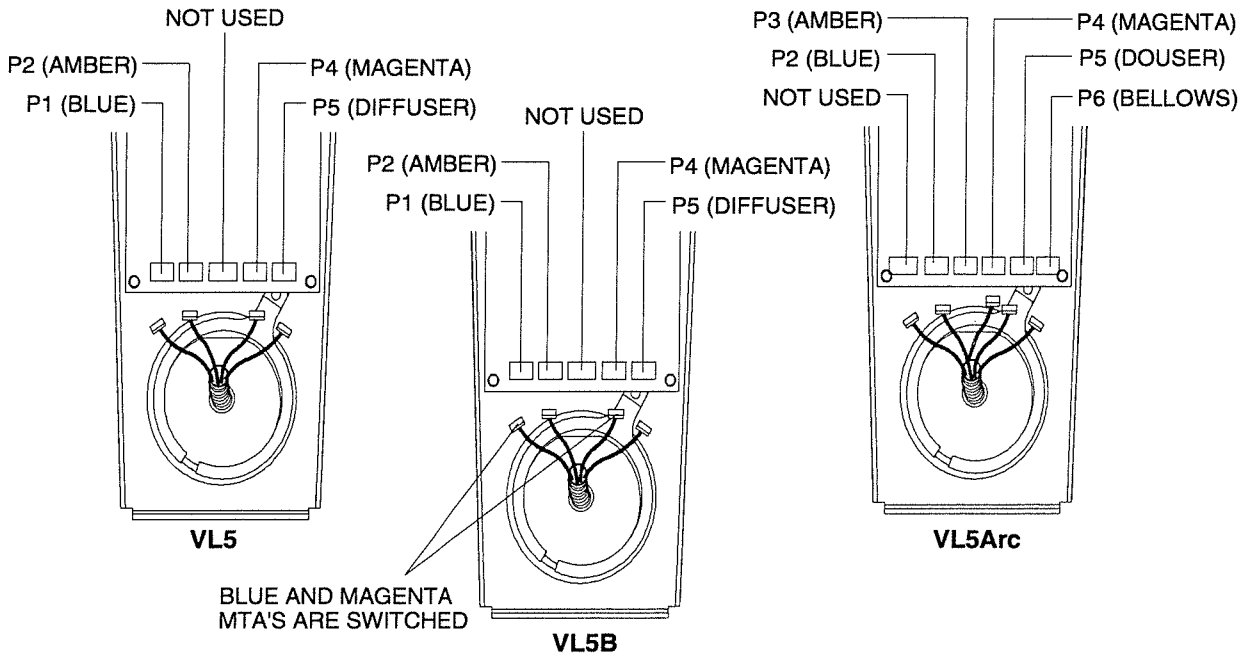


Figure 3-19. Actuator Motors LCB Connections

Step 4. At tilt mechanism, using 5/32 inch Allen wrench, insert Allen wrench through hole in top of yoke leg and into head of 10-32x1"SCSS tilt mechanism belt tension and adjustment screw. Loosen until belt will slip off of pulley.

Step 5. At driven pulley, identify whether two setscrews (a), one pan head screw (b), or four acorn nuts (c) secure pulley to tilt tube.

a. For single pan head screw, using #1 Phillips screwdriver, fit between yoke leg flanges (**Figure 3-20**) and remove 6-32x9/16"PPZ screw and #6 internal tooth lockwasher that secure driven pulley to tilt tube and remove pulley from tilt tube.

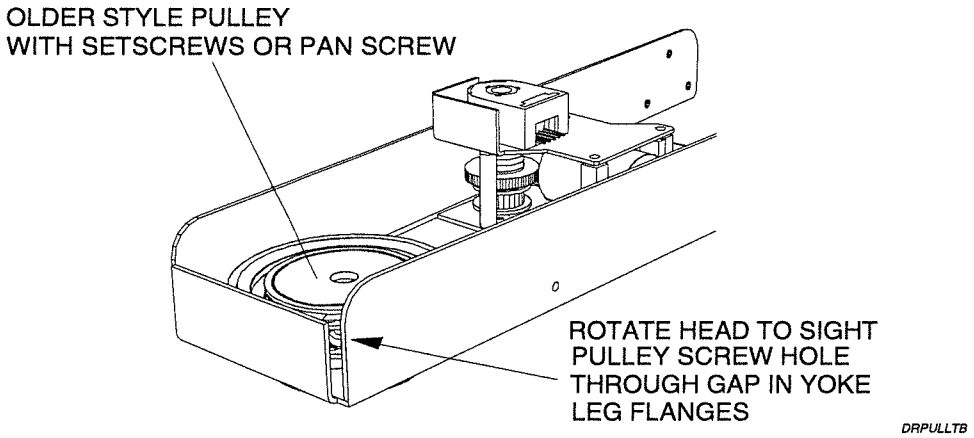


Figure 3-20. Removing Old Style Driven Pulley

b. For setscrews, using 9/16 inch Allen wrench, fit between yoke leg flanges, loosen two setscrews that secure driven pulley to tilt tube, and remove pulley from tilt tube.

c. For four acorn nuts (with collet assembly), using 5/16 inch nutdriver, gradually loosen nuts in cross pattern to prevent pulley from cracking. Loosen until collet and pulley assembly can be removed from tilt tube. (Do not loosen so much that collet and pulley are separated.) (**Figure 3-21**).

Step 6. At top yoke cross member, remove four 6-32x5/16"PPSS screws that secure heat shield to yoke cross member and remove heat shield.

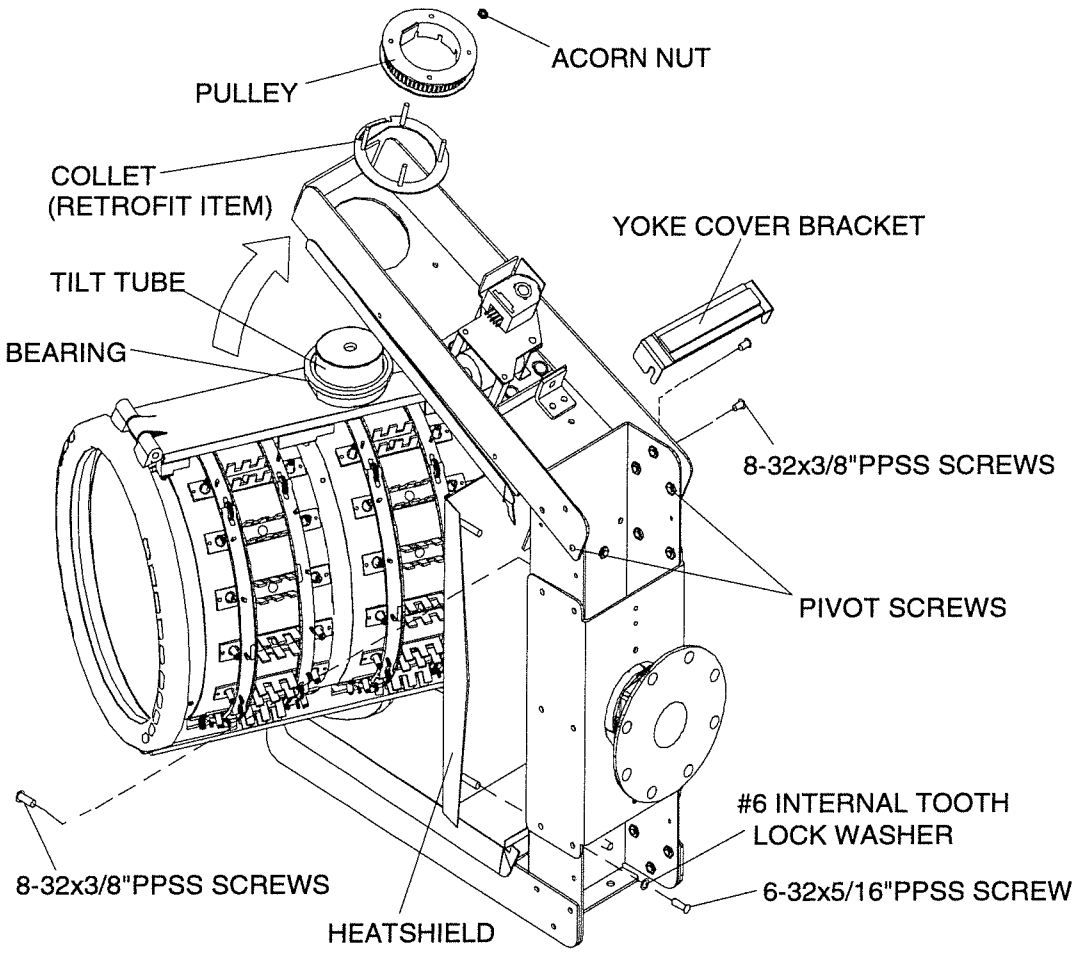


Figure 3-21. Luminaire Head Removal from Yoke Assembly

Step 7. At tilt-side yoke leg, at corner of cross member, loosen, but do not remove, 8-32x3/8"PPSS screw on each side of yoke leg closest to pan tube.

Step 8. Loosen and remove four remaining 8-32x3/8"PPSS screws (two on each side) on yoke leg that secure leg to cross member. (Yoke cover bracket, if installed, may come off when screws that secure it are loosened.)

Step 9. At bottom of cross member, remove two 8-32x3/8"PPSS screws that secure yoke leg to cross member and pivot leg away from luminaire head.

Step 10. Remove luminaire head from yoke.

Step 11. Open both latches, swing open heat sink and front ring assemblies, and remove top and bottom luminaire head covers.

Step 12. At heat sink assembly, remove lamp.

Step 13. At linear actuators, disconnect actuator/drive ring links from swivel links on drive rings (**Figure 3-22**).

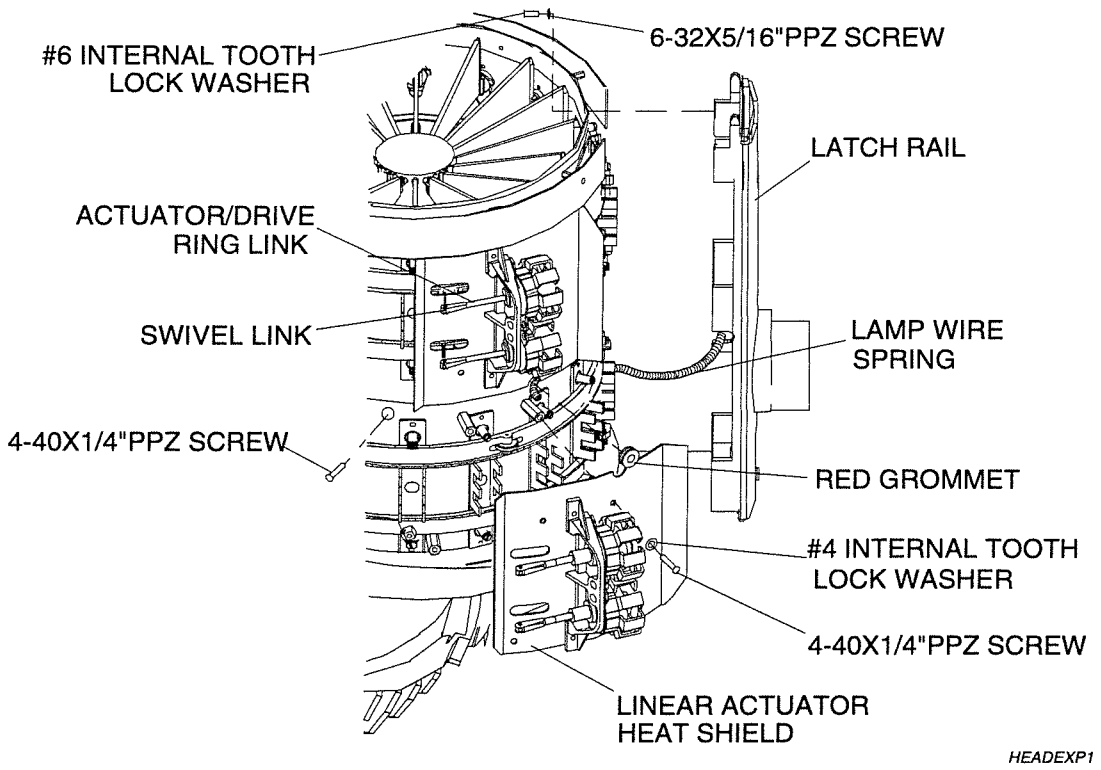


Figure 3-22. Actuator Heat Shields and Latch Rail Removal and Replacement

Step 14. At linear actuator heat shields, remove four 4-40x1/4"PPZ screws and #4 internal tooth lock washers from each heat shield that secures heat shields to luminaire head and remove heat shields (with linear actuators installed).

Step 15. At ends of latch rail, inside head assembly, remove two 6-32x3/8"PPSS screws and #6 internal tooth lock washers from each end of rail that secure rail to head assembly.

Step 16. While holding latch rail and linear actuator heat shields, remove rail and heat shields and set aside. Linear actuators and latch rail are connected by latch rail spring and wires running through each.

Step 17. At ends of hinge rail, inside head assembly, remove two 6-32x3/8"PPSS screws and #6 internal tooth lock washers from each end of rail that secure rail to head assembly and remove hinge rail with front ring assembly and heat sink assembly.

Step 18. At middle of head assembly, remove four 4-40x1/4"PPZ screws that secure front bulkhead assembly to rear bulkhead assembly. Carefully separate bulkhead assemblies.

Step 19. To re-assemble, do steps 2 thru 18 in reverse. (Ensure that tilt mechanism belt is properly retightened. Refer to Pan/Tilt Belt Tension Adjustment paragraph.)

3.3.1.10 Color Filter Removal and Replacement

Parts:

as needed:

1 EA ASSY, VL5 SWP FILTER (BLUE) (22-9634-0123)
1 EA ASSY, VL5B CCF DOWNSCALE FILTER, MAGENTA (22-9634-0189)
1 EA ASSY, VL5B CCF UPSCALE FILTER, MAGENTA (22-9634-0190)
1 EA ASSY, VL5 LWP FILTER (AMBER) (22-9634-0124)
1 EA ASSY, VL5 CCF FILTER (MAGENTA) (22-9634-0125)
1 EA ASSY, VL5B SWP DOWNSCALE FILTER, BLUE (22-9634-0187)
1 EA ASSY, VL5B SWP UPSCALE FILTER, BLUE (22-9634-0188)

Tools:

Cotton gloves or finger cots
Screwdriver, tweaker

To remove and replace a color filter assembly:

Step 1. Remove power to luminaire with filter and diffuser panels in open position.

Step 2. Open both latches and swing open heat sink and front ring assemblies, and remove top and bottom luminaire head covers.

Step 3. Determine location of color filter to be replaced (**Figure 3-23**). Also refer to Luminaire Descriptions paragraph in Chapter 1 for location of color filters in each version of the luminaire.

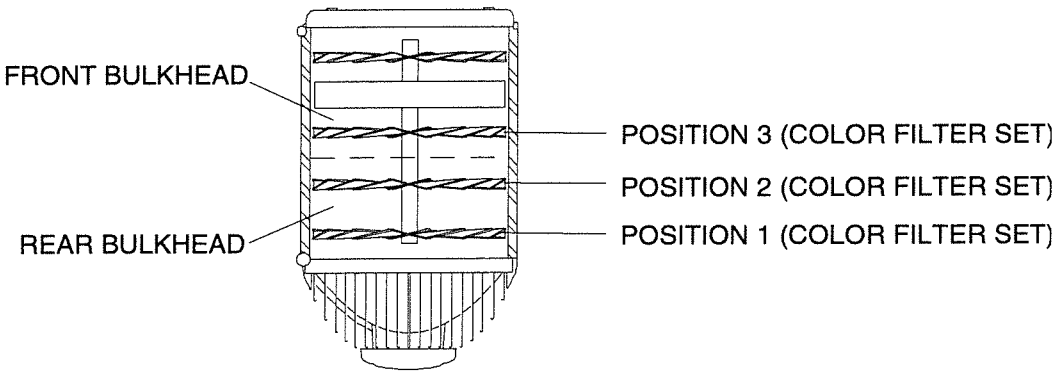


Figure 3-23. Color Filter Positions

Step 4. Do one of the following:

a. To access Position 1 filter assemblies, leave open heat sink assembly.

b. To access Position 2 or 3 filter assemblies, separate bulkheads. See Separating Front and Rear Bulkheads paragraph.

CAUTION: Wear clean, white cotton gloves or finger cots when handling dichroic filters.

Step 5. At color filter assembly to be replaced, gently push filter assembly (with silicone pad) in towards center hub (away from filter carrier) and work end of tweaker screwdriver between silicone pad and filter carrier (**Figure 3-24**). Gently work side of silicone pad, not under filter carrier arch, free. After side of silicone pad is free from filter carrier, remove silicone pad from under filter carrier arch and remove filter assembly. (Work carefully, filters are secured to silicone pad with UV-cured RTV and pad can become separated. If they become separated, new filter assembly must be installed since RTV must be UV-cured.)

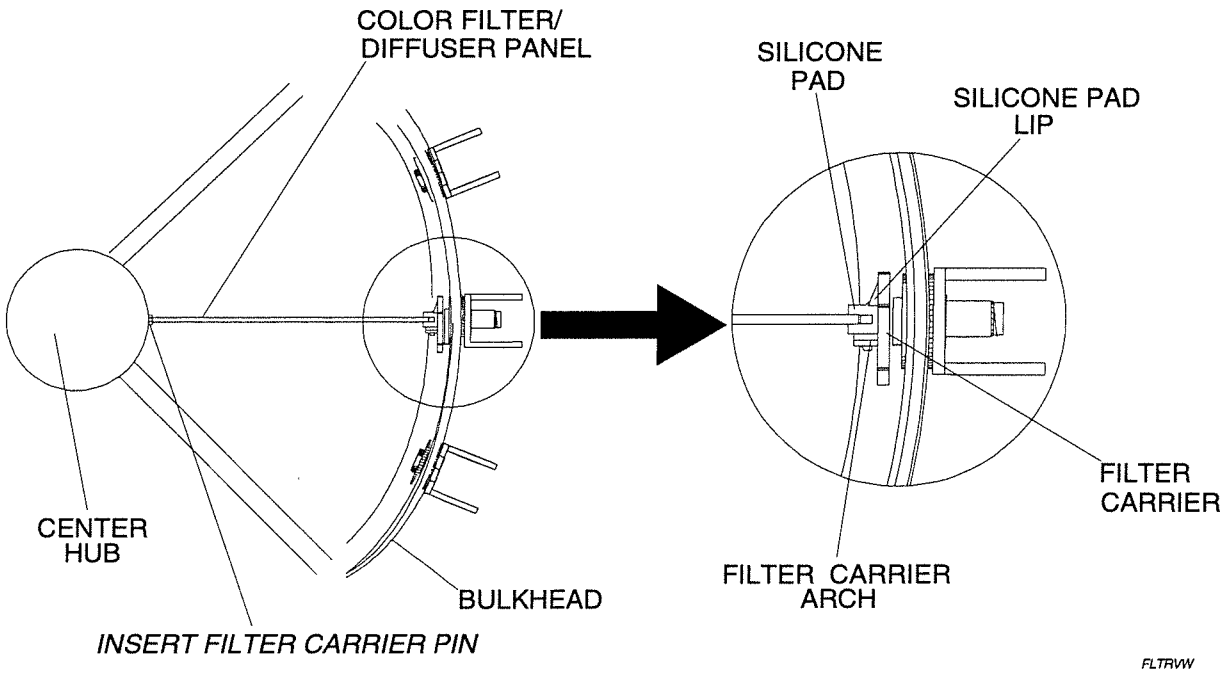


Figure 3-24. Color Filter Assembly Removal and Replacement

Note: For the **VL5B** luminaire, upscale and downscale filters must be installed in alternating order (**Figure 3-25**). These can be identified by either gray (downscale) or white (upscale) pads.

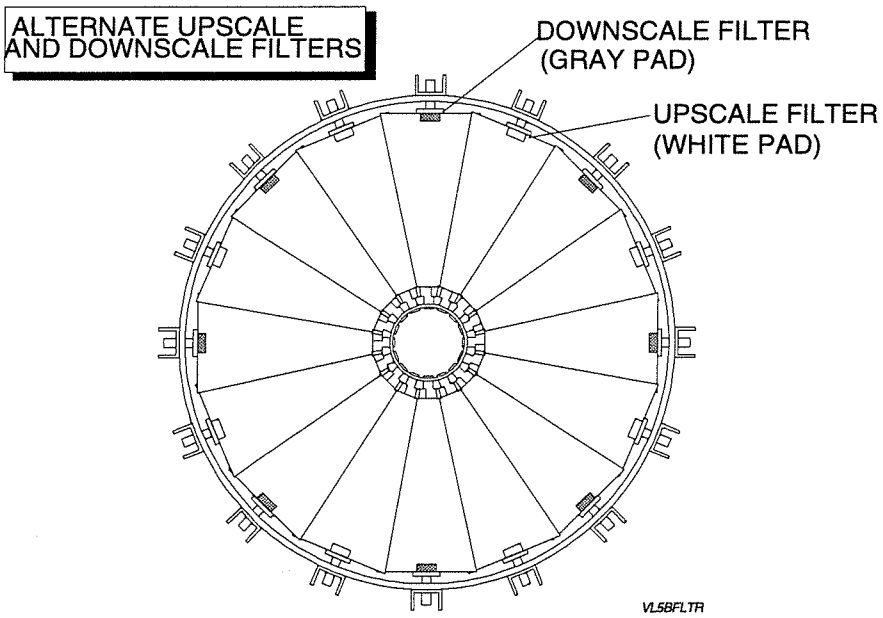


Figure 3-25. Upscale/Downscale Color Filter Installation

Step 6. At replacement filter assembly, insert filter carrier pin into center hub.

Step 7. Place side of silicone pad with lip into arch on installed filter carrier.

Step 8. Using tweaker screwdriver, gently run screwdriver tip over silicone pad, driving silicone pad into filter carrier and fully seating silicone pad.

Step 9. Re-assemble luminaire.

3.3.1.11 Diffuser/Douser Panel Removal and Replacement

Parts:

as needed:

1 EA ASSY, VL5 DIFFUSER PANEL (22-9634-0126)

1 EA ASSY, AR500 DIMMER (Douser) PANEL (22-9642-0076) (**VL5Arc**)

Tools:

Cotton gloves or finger cots

Screwdriver, tweaker

To remove and replace a panel assembly:

Step 1. Remove power to luminaire with filter and diffuser panels in open position.

Step 2. Open both latches, swing open heat sink and front ring assemblies, and remove top and bottom luminaire head covers.

Step 3. Leave open front ring assembly to access diffuser panel assembly.

CAUTION: Wear clean, white cotton gloves or finger cots when handling diffuser panels.

Step 4. At panel assembly to be replaced, gently push panel assembly (with silicone pad) in towards center hub (away from filter carrier) and work end of tweaker screwdriver between silicone pad and filter carrier (**Figure 3-24**). Gently work side of silicone pad, not under filter carrier arch, free. After side of silicone pad is free from filter carrier, remove silicone pad from under filter carrier arch and remove diffuser panel assembly. (Work carefully, panels are secured to silicone pad with UV-cured RTV and pad can become separated. If they become separated, a new panel assembly must be installed since RTV must be UV-cured.)

Step 6. Place side of silicone pad with lip into arch on installed filter carrier.

Step 7. Using tweaker screwdriver, gently run screwdriver tip over silicone pad, driving silicone pad into filter carrier and fully seating silicone pad.

Step 8. Re-install both luminaire head covers and close heat sink and front ring assemblies, securing latches.

3.3.1.12 Drive Ring Pin Replacement

Parts:

1 EA PIN, 1/8OD X 3/8L TYPE-H, AL-6061-T6, DRIV-LOK (55-6612-0008)
1 EA COPPER POWDER (06-6041-0001)

Tools:

Screwdriver, Phillips #2
Screwdriver, tweaker
Needle-nose pliers
Water, room temperature
Salt, granular
White cotton gloves
Finger cots or rubber gloves
VL5 guide pin installation (10-9624-0109)
VL5 guide pin setting (10-9624-0110)

To replace a drive ring pin:

Step 1. Remove power to luminaire with filter and diffuser panels in open position.

Step 2. Open both latches, swing open heat sink and front ring assemblies, and remove top and bottom luminaire head covers.

Step 3. Position luminaire, with heat sink or front ring assembly swung open to access outer filter sets or separate bulkheads to access inner filter sets (whose drive ring is missing pins). Refer to Separating Front and Rear Bulkheads paragraph if necessary.

Step 4. At appropriate linear actuators, disconnect actuator/drive ring links from swivel links on drive rings.

Step 5. At linear actuator heat shield, remove four 4-40x1/4"PPZ screws and #4 internal tooth lock washers that secure heat shield to luminaire head and remove heat shields (with linear actuators installed) (**Figure 3-26**).

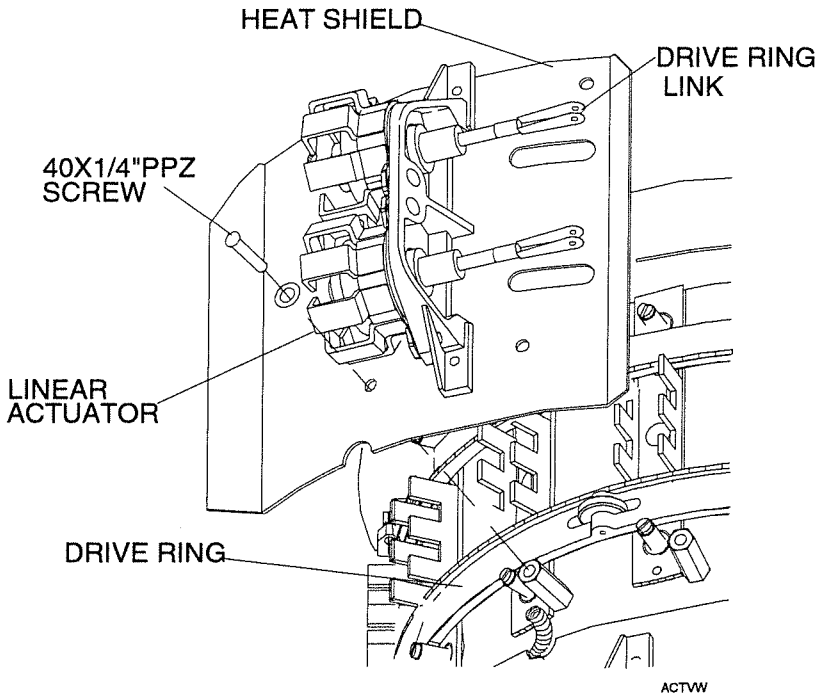


Figure 3-26. Linear Actuator Heat Shield Removal

CAUTION: To prevent damage to filter panels, wear clean, white cotton gloves when handling panels.

Step 6. Remove four filter panels located on the same carrier holder as the drive ring pins. Refer to Color Filter Removal and Replacement paragraph or Diffuser/Douser Removal and Replacement paragraph.

Step 7. At drive ring, use fingers to remove loose drive ring pins, if present. ONLY MISSING PINS OR PINS THAT CAN BE REMOVED WITH FINGERS SHOULD BE REPLACED. A SLIGHTLY LOOSE PIN IS *NOT* CONSIDERED A FAILURE.

CAUTION: New drive ring pins should never be handled with pliers. Pliers will scar aluminum pin and could damage color changer mechanism.

Step 8. Prepare copper powder paste.

a. Take room temperature water and mix in more salt than can be dissolved (i.e., there will be salt at bottom of container).

b. Place some copper powder into another container and add enough salt water to form paste. If too much salt water is added, pour or blot it off.

CAUTION: Finger cots or rubber gloves should be worn when working with copper paste.

Hint: Install each pin separately. If copper paste sets before pin is inserted, drive ring will have to be replaced.

Step 9. Work copper paste into three grooves and around base of new guide pin.

Step 10. At drive ring, use special installation tool to carefully press prepared guide pin through drive ring groove into carrier holder until tool is even with drive ring flange (**Figure 3-27**).

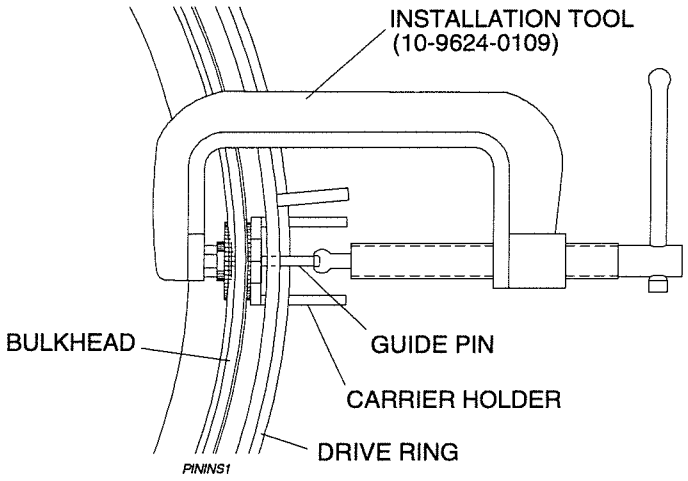


Figure 3-27. Guide Pin Installation

Step 11. At newly installed pin location, use special set tool to press guide pin approximately flush with outer face of drive ring. Approximately 3/16 inch of pin should protrude from carrier holder (**Figure 3-28**).

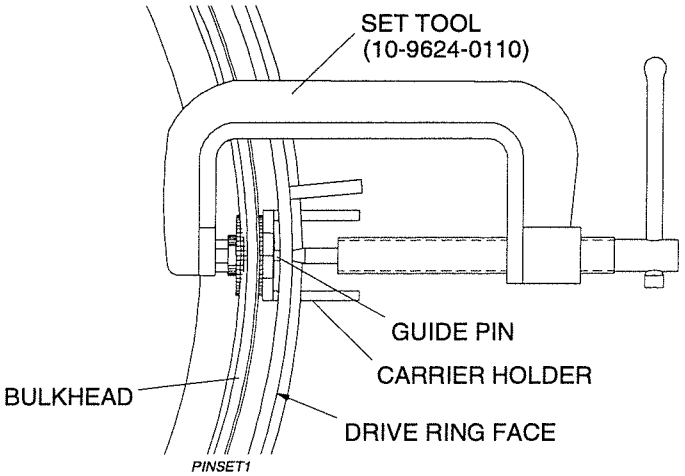


Figure 3-28. Guide Pin Setting

Step 12. Quickly check pin alignment. If pin is misaligned, use pliers to remove pin, discard pin, and repeat process to re-install new pin. The pin will quickly become locked and very difficult to remove from unit.

Step 13. ***Important***: Thoroughly remove all excess copper paste from pin, carrier holder and drive ring.

Step 14. Repeat Steps 9 through 13 for remaining guide ring pin locations.

Step 15. At modified filter panel assembly, check drive ring movement. Drive ring should slide around unit from stop to stop without binding. If binding occurs, pin may not be straight. Check all four pins for interference and, if needed, replace pin.

Step 16. At color filter panel assembly, insert filter carrier and use needle-nose pliers to install filter carrier spring.

Step 17. Place filter carrier pin in center hub.

Step 18. Place side of silicone pad with lip into arch on installed filter carrier.

Step 19. Using tweaker screwdriver, gently run screwdriver tip over silicone pad, driving silicone pad into filter carrier and fully seating silicone pad (**Figure 3-24**).

Step 20. Repeat Steps 16 through 19 for remaining color filter panels.

Step 21. At side of head, re-install linear actuator heat shield onto bulkhead and secure in place with four 4-40x1/4″PPZ screws (**Figure 3-26**).

Step 22. At linear actuators, connect actuator/drive ring links to swivel links on drive rings.

Step 23. Install top and bottom head covers and close and latch front ring and heat sink assemblies.

3.3.1.13 Linear Actuator Assembly Removal and Replacement

Parts:

1 EA ASSY, VL5 LINEAR ACTUATOR (22-9634-0128)
1 EA RECEPT. MTA100 W/TAB GRN 4 POS. (52-6396-2804)
1 EA COVER, STRAIN RELIEF/4POS MTA (52-6424-0004)

Tools:

Diagonal cutters
Screwdriver, Phillips #1
MTA crimp gun

To remove and replace linear actuator (motor) assembly:

Step 1. Remove power to luminaire.

Step 2. Open both latches, swing open heat sink and front ring assemblies, and remove top and bottom luminaire head covers.

Step 3. Remove board-side yoke leg cover.

Step 4. At LCB, disconnect 4-pin MTA connector for linear actuator assembly to be replaced (**Figure 3-29**).

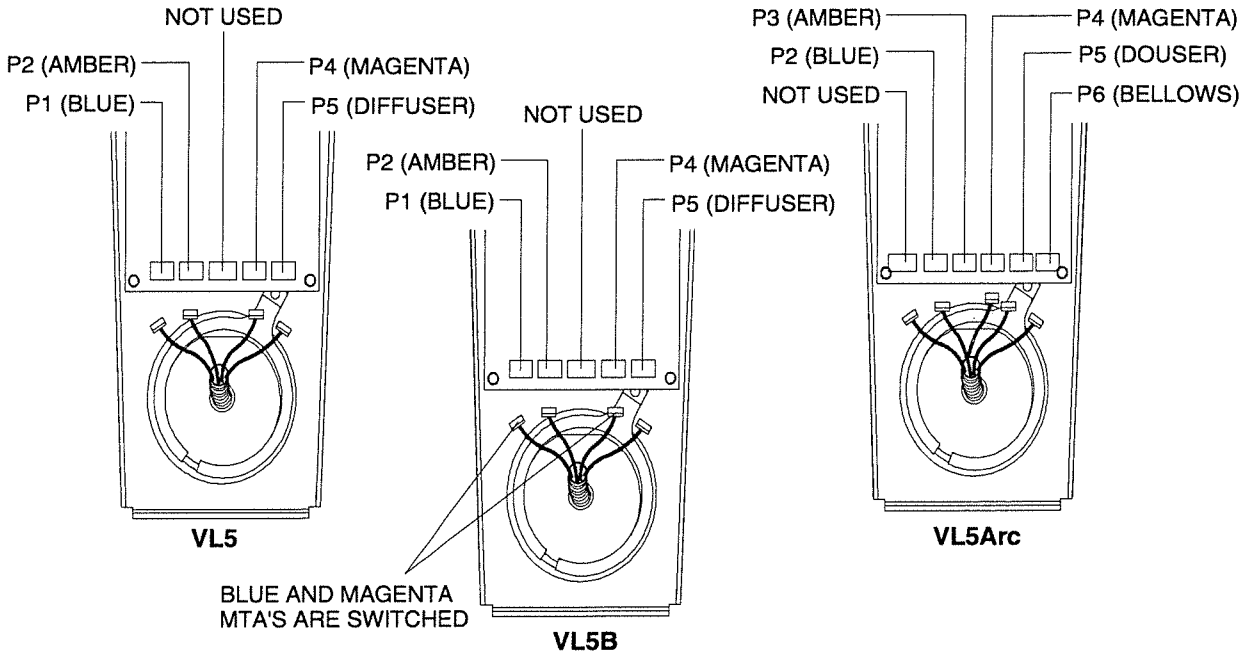


Figure 3-29. Linear Actuator MTA Connector Locations

Step 5. Using wire cutter, cut off MTA connector from disconnected motor wires.

Step 6. At linear actuator assembly, pull wires through lamp wire spring (**Figure 3-30**).

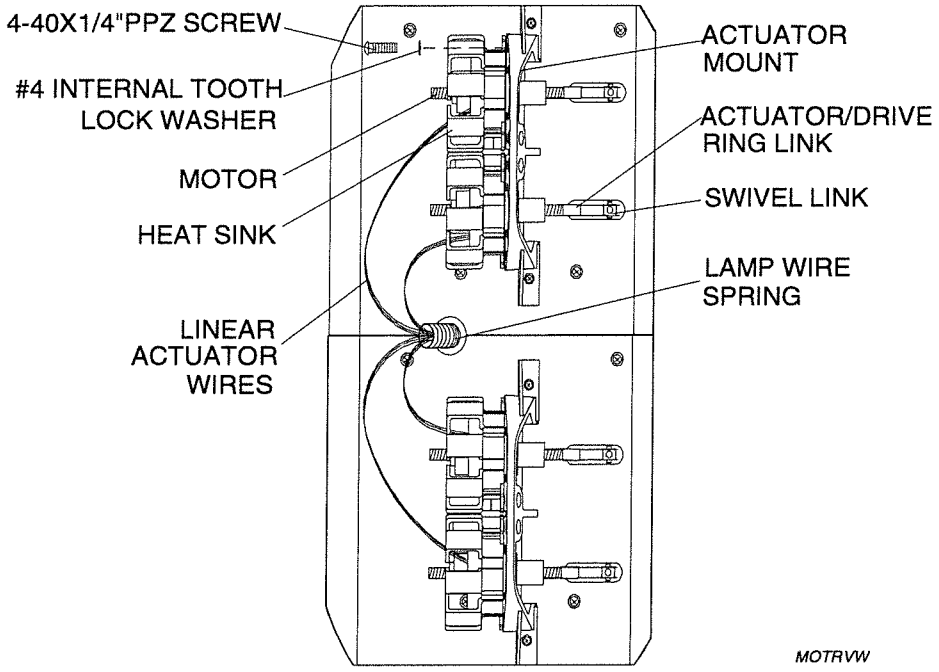


Figure 3-30. Linear Actuator Removal and Replacement

Step 7. At actuator/drive ring link, separate link from swivel link mounted to drive ring.

Step 8. Remove two 4-40x1/4"PPZ screws and #4 internal tooth lock washers that secure linear actuator motor assembly and heat sink to actuator mount and remove motor and heat sink.

Step 9. Separate heat sink from actuator motor.

Step 10. Place heat sink on replacement actuator motor.

Step 11. Place actuator motor and heat sink in place on actuator mount.

Step 12. Secure actuator/drive ring link to drive ring swivel link.

Step 13. Secure linear actuator assembly to actuator mount with two 4-40x1/4"PPZ screws and #4 internal tooth lock washers.

Step 14. Feed linear actuator assembly wires into lamp wire spring and push wires through spring until exposed at other end of spring.

Step 15. If linear actuator assembly wires have colored heatshrink markers to denote filter color (diffuser is white), replace heatshrink or use colored tape.

Step 16. Using MTA crimp gun, crimp wires with a 4-pin MTA connector using the following pinouts:

Pin	Wire
4	Green
3	Blue
2	Black
1	Red

Step 17. Install strain relief cover on 4-pin MTA connector.

Step 18. Connect MTA connector to LCB header.

Step 19. Re-install yoke leg covers and luminaire head covers.

3.3.2 Yoke Assembly Maintenance

3.3.2.1 Pan/Tilt Belt Tension Adjustment

Tools:
Wrench, Allen, 5/32 inch

Loose pan/tilt drive belts can create calibration problems with **Series 300** luminaires and mirrors. When the unit goes to the end of travel, excess belt slack can produce a vibration which causes the encoder to continue producing a movement output signal to the processor (even though the unit is at its stop).
To fix this problem, slowly increase the belt tension until the vibration is dampened.

CAUTION: Do not overtighten belt, pulley will break.

To adjust either the pan mechanism or tilt mechanism pulley belt:

Step 1. Pan or tilt mirror back and forth, noting the tension created on one side of belt and deflections on the other (**Figure 3-31**).

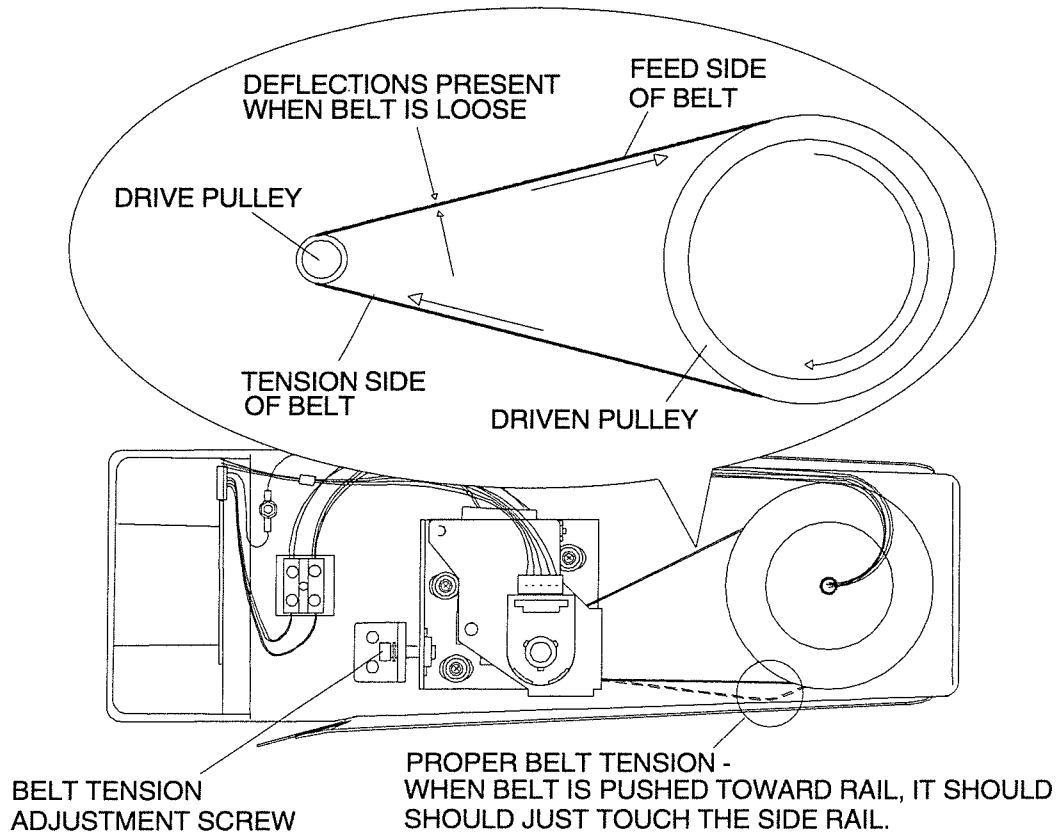

DEFLECTIONS PRESENT WHEN BELT IS LOOSE
FEED SIDE OF BELT
DRIVE PULLEY
TENSION SIDE OF BELT
DRIVEN PULLEY
BELT TENSION ADJUSTMENT SCREW
PROPER BELT TENSION - WHEN BELT IS PUSHED TOWARD RAIL, IT SHOULD SHOULD JUST TOUCH THE SIDE RAIL.

Figure 3-31. Belt Tension Adjustment

Note: Bilateral Deflection may be observed by loosening the tension adjustment screw and rotating the head unit. As the unit is rotated back and forth, the tension is created on one side and deflections are created on the other side.

Step 2. With 5/32 inch Allen wrench, tighten belt tension adjustment screw until no bilateral deflection occurs.

Step 3. With proper tension, you should be able to push the belt flat so that it just touches side rail.

3.3.2.2 Tilt Driven Pulley Removal and Replacement

Parts:

1 EA PULLEY, PTA DRIVEN (10-9634-0171)
1 EA COLLET, PTA DRIVEN PULLEY (10-9634-0174)
4 EA NUT, 6-32, ACORN, TREADLOCKING, SS (53-2002-0004)
2 EA CABLE TIE, SMALL .10X4" (55-2186-0001)

as needed:

1 EA TUBE, VL5 TILT AXIS (10-9634-0064 C)
(NOT IN TEST RACK)

Tools:

Screwdriver, Phillips #2
Screwdriver, slotted #1
Nutdriver, 5/16 inch
Diagonal cutters
Wrench, Allen, 5/32 inch
Wrench, Allen, 9/16 inch
Loctite #425
as needed:
Drill with #28 drill bit and countersink
Center punch and hammer

To remove tilt driven pulley:

Step 1. Remove power to luminaire.

Step 2. Remove tilt-side yoke leg cover.

Step 3. Remove tilt mechanism pulley belt as follows:

a. Insert 5/32 Allen wrench through hole in top of tilt-side yoke leg and into head of 10-32x1"SCSS tilt mechanism belt tension adjustment screw. Loosen and remove screw and #10 flat washer.

b. Slide tilt mechanism down to loosen belt. Remove belt from pulley.

Step 4. At terminal strip, using #1 slotted screwdriver, disconnect blue lamp wires and green ground wires.

WARNING: If lamp wires are white, lamp wires and socket must be replaced with socket having blue wires. White wires may explode causing personnel injury and equipment damage. Refer to Lamp Socket Removal and Replacement paragraph.

Step 5. At threaded stud, using 5/16 inch nutdriver, remove 6-32 KEPS nut and remove ring terminal of green ground wire.

Step 6. At driven pulley, identify whether two setscrews (a), one pan head screw (b), or four acorn nuts (c) secure pulley to tilt tube.

a. For single pan head screw, using #1 Phillips screwdriver, fit between yoke leg flanges (**Figure 3-32**) and remove 6-32x9/16"PPZ screw and #6 internal tooth lockwasher that secure driven pulley to tilt tube and remove pulley from tilt tube.

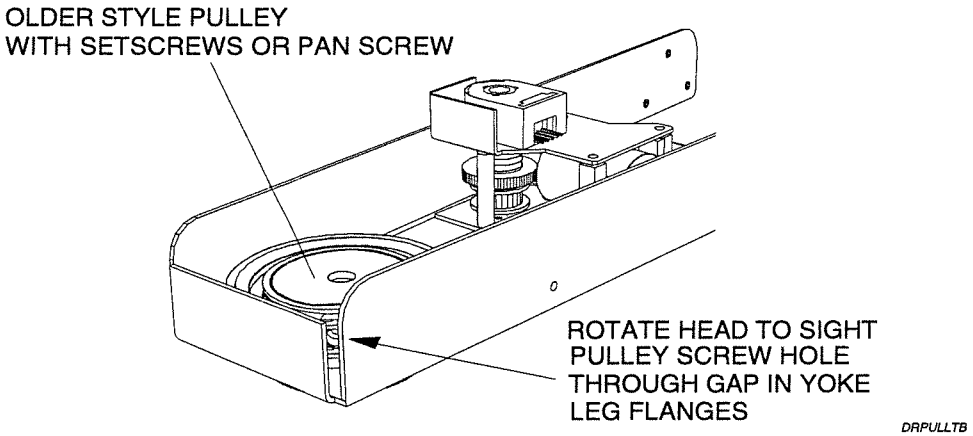


Figure 3-32. Removing Old Style Driven Pulleys

b. For setscrews, using 9/16 inch Allen wrench, fit between yoke leg flanges, loosen two setscrews that secure driven pulley to tilt tube, and remove pulley from tilt tube.

c. For four acorn nuts (with collet assembly), using 5/16 inch nutdriver, gradually loosen nuts in cross pattern to prevent pulley from cracking. Loosen until collet and pulley assembly can be removed from tilt tube. (Do not loosen so much that collet and pulley are separated.) (**Figure 3-33**).

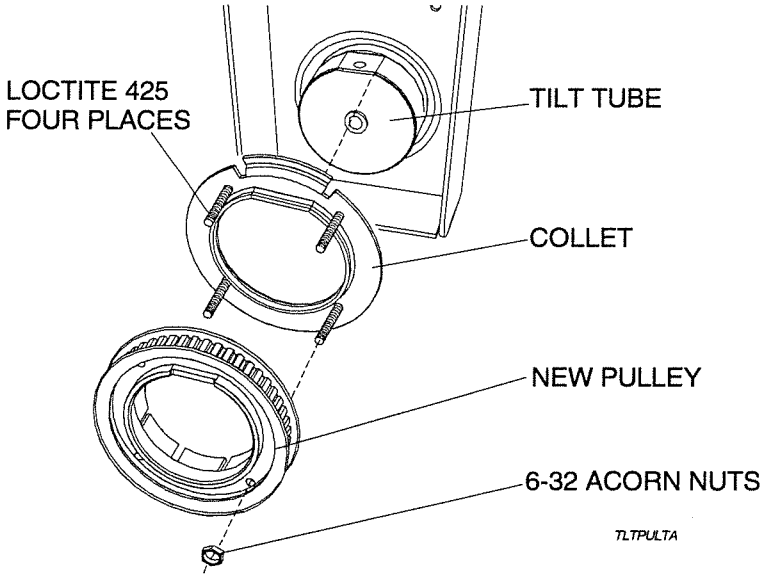


Figure 3-33. New Style Pulley and Collet Assembly

Note: In all cases, the driven pulley should be replaced with the pulley and collet assembly which is the latest luminaire upgrade. For pulleys that are secured by two setscrews, the tilt tube must also be replaced to accommodate this new pulley. These parts must be ordered from the shop before continuing.

To install new tilt tube for pulley and collet assembly:

Step 7. Set luminaire on board-side yoke leg (**Figure 3-34**).

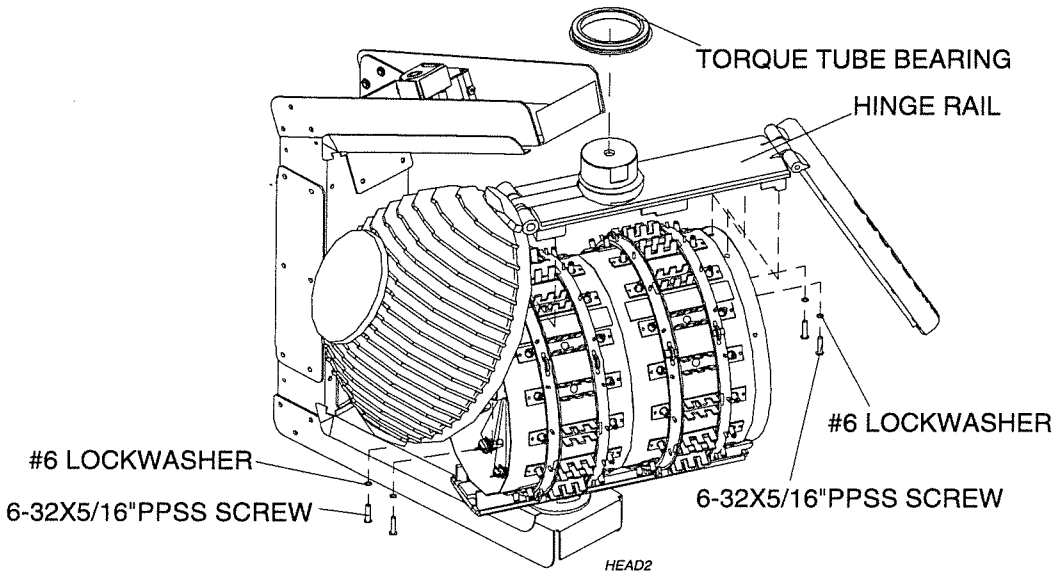


Figure 3-34. Removing Hinge Rail From Luminaire Head

Step 8. At top yoke cross member, remove four 6-32x5/16"PPSS screws that secure heat shield to yoke cross member and remove heat shield.

Step 9. At corner of yoke leg and cross member, loosen, but do not remove, 8-32x3/8"PPSS screw on each side of yoke leg closest to pan tube.

Step 10. Loosen and remove four remaining 8-32x3/8"PPSS screws on yoke leg that secure leg to cross member.

Step 11. At bottom of cross member, remove two 8-32x3/8"PPSS screws that secure yoke leg to cross member and pivot leg up away from luminaire head. Tighten two pivot screws loosened in Step 9.

Step 12. At tilt tube, remove torque tube bearing.

Step 13. At latch rail, open front latch and swing open front ring assembly.

Step 14. Remove glass from front ring.

Step 15. At latch rail, open rear latch and swing open heat sink assembly.

Step 16. Remove lamp from heatsink assembly

Step 17. Remove top and bottom head covers.

Step 18. At ends of hinge rail, inside head assembly, remove two 6-32x3/8"PPSS screws and #6 internal tooth lock washers from each end of rail that secure hinge rail to head assembly. Remove hinge rail.

Step 19. At tilt tube, remove four 6-32x3/8"PPSS screws and #6 internal tooth lock washers that secure tilt tube to hinge rail and remove old style tilt tube (**Figure 3-35**).

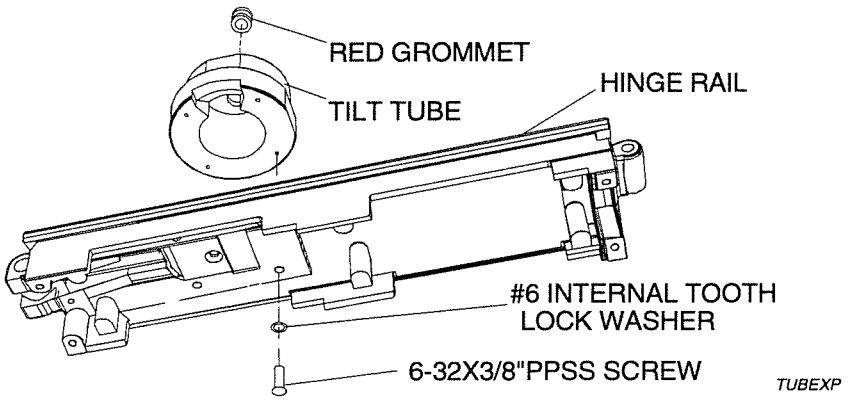


Figure 3-35. Tilt Tube Removal and Replacement

Step 20. Slide tilt tube over lamp and ground wires, removing from rail.

Step 21. Remove red grommet from old tilt tube. At replacement tilt tube, install red grommet.

Step 22. Insert lamp and ground wires through tilt tube grommet. Make sure that strain relief knot is inside tilt tube.

Step 23. Secure replacement tilt tube to hinge rail with four 6-32x3/8"PPSS screws and #6 internal tooth lock washers.

Step 24. Secure hinge rail to head assembly with two 6-32x3/8"PPSS screws and #6 internal tooth lock washers at each end of rail (**Figure 3-34**).

Step 25. Re-install top and bottom head covers.

Step 26. Re-install lamp in heatsink assembly and secure assembly closed with latch.

Step 27. Re-install lens in front ring and secure ring closed with latch.

Step 28. Re-install bearing on tilt tube. Make sure that bearing is properly oriented: larger part of bearing fits into yoke leg.

Step 29. At yoke leg and cross member, loosen two 8-32x3/8"PPSS pivot screws and pivot yoke leg onto tilt tube. Make sure that torque tube bearing properly fits into yoke leg.

Step 30. Re-install six 8-32x3/8"PPSS screws that secure yoke leg to cross member. Make sure that yoke is square before tightening all eight screws.

Note: It is also necessary to move one of the cable anchor mounts during installation of this new pulley and collet assembly.

Step 31. Drill new cable anchor mounting hole:

a. At tilt-side yoke leg, remove 4-40x1/4"PFB screw and 4-40 zinc plated KEP nut securing white cable anchor to yoke leg (**Figure 3-36**). Remove white cable anchor.

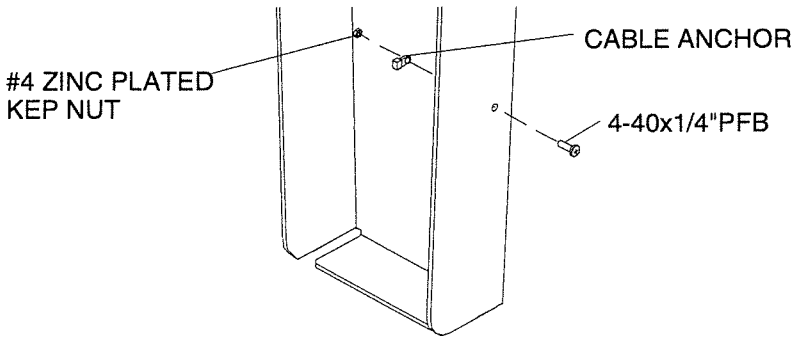


Figure 3-36. Cable Anchor Removal

b. Measure 0.576 (approx. 9/16″) from yoke leg outer edge (on same horizontal line as current hole) and mark with center punch and hammer (**Figure 3-37**).

c. At newly marked location, use drill and #28 (0.14″ dia.) drill bit to drill completely through yoke leg.

d. Using countersink, countersink newly drilled hole approximately 0.230 inch diameter. *Countersink should be large enough that screw head is flush with outer leg surface but, not so large that screw head protrudes leg surface.*

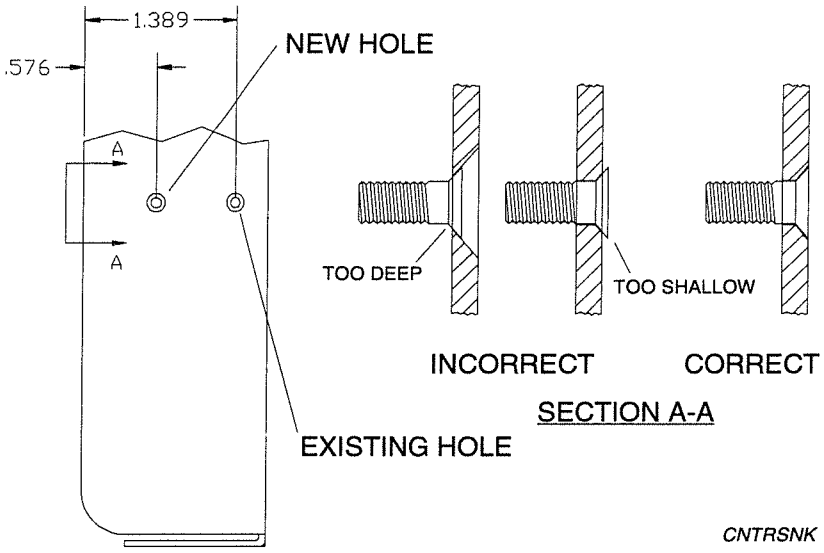


Figure 3-37. New Cable Anchor and Hole and Countersink

Step 32. At newly drilled and countersunk hole, install white cable anchor with 4-40x1/4″PFB screw and #4 nut. Apply Loctite 242 to screw and nut.

Install new pulley:

Step 33. Install replacement pulley collet onto pulley (**Figure 3-33**). Make sure that collet is oriented to match "D" shape in pulley.

Step 34. At four collet studs, apply Loctite #425.

Step 35. Install four 6-32 acorn nuts onto collet and slightly tighten to hold pieces together.

Step 36. Slide pulley (with collet) fully down onto tilt tube. Make sure that collet is between yoke side and pulley.

CAUTION: Do not overtighten pulley acorn nuts or pulley may crack.

Step 37. Using 5/16 inch nutdriver, fully tighten, but do not overtighten, 6-32 acorn nuts *in a cross pattern*. Check to see if pulley slips on tilt tube when collet stop hits tilt stop for normal tilt operation. Retighten as needed.

Step 38. Re-install heat shield on yoke cross member and secure in place with four 6-32x5/16"PPSS screws.

Step 39. Re-install tilt mechanism and tighten belt. Refer to Pan/Tilt Belt Tension Adjustment paragraph.

CAUTION: **VL5** luminaire lamp wires must be dressed by the following method. Failure to dress the lamp wires properly will result significantly lower lamp wire life. The main objective to dressing the lamp wires is to prevent the wires from twisting inside the tilt tube grommet.

Step 40. Position luminaire with lens flat on work surface and yoke pushed toward top lamp cover side (**Figure 3-38**).

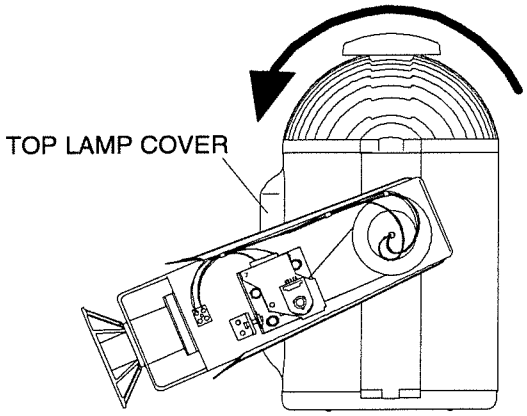


Figure 3-38. Positioning Yoke for Wire Dressing

Step 41. At terminal strip, using #1 slotted screwdriver, reconnect two lamp socket wires.

Step 42. At threaded stud, using nutdriver, re-install ring terminal of green ground wire assembly with 6-32 KEPS nut.

Step 43. Dress and secure lamp wires:

a. At tilt tube grommet, pull excess lamp wire length thru tilt tube grommet. Group lamp wires and ground wires together (**Figure 3-39**).

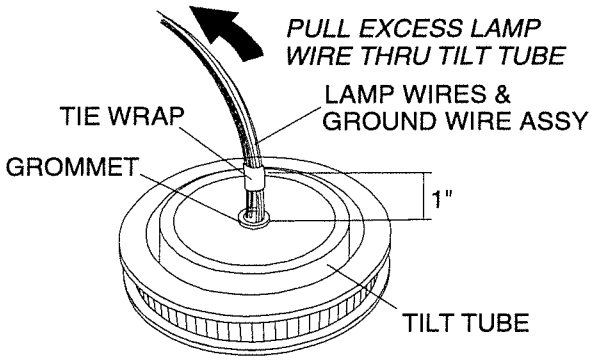


Figure 3-39. Dressing Lamp and Ground Wires

b. With wires slightly twisted together, install a small cable tie around wires approximately one inch from grommet.

c. With head assembly positioned as shown in **Figure 3-40**, *View A*, twist wires in a clockwise direction until the wires form a loop.

d. Install a small cable tie around wires approximately six inches from grommet.

e. Secure lamp wires to yoke leg cable anchors with two small cable ties.

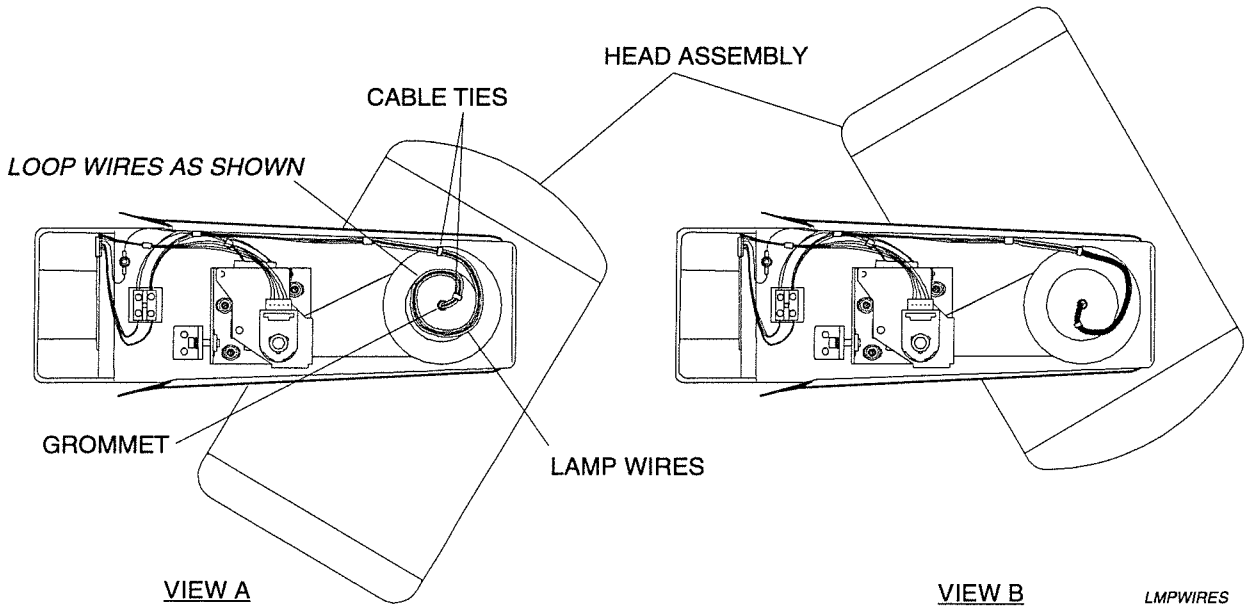


Figure 3-40. Creating Service Loop in Lamp Wires

Step 44. Rotate head assembly to ensure wires coil and uncoil smoothly.

Step 45. Re-install cover on tilt-side leg.

3.3.2.3 Tilt Mechanism Removal and Replacement

Parts:

1 EA ASSY, VL5 PAN/TILT MECHANISM (22-9634-0009)
2 EA CABLE TIE, SMALL .10X4" (55-2186-0001)

Tools:

Screwdriver, Phillips #2
Screwdriver, slotted #1
Nutdriver, 5/16 inch
Diagonal cutters
Wrench, Allen, 5/32 inch

To remove and replace tilt mechanism:

Step 1. Remove power to luminaire.

Step 2. At tilt-side leg, remove leg cover.

Step 3. Using diagonal cutter, at side of yoke leg, remove two cable ties that secure green and white wires. (**Figure 3-41**).

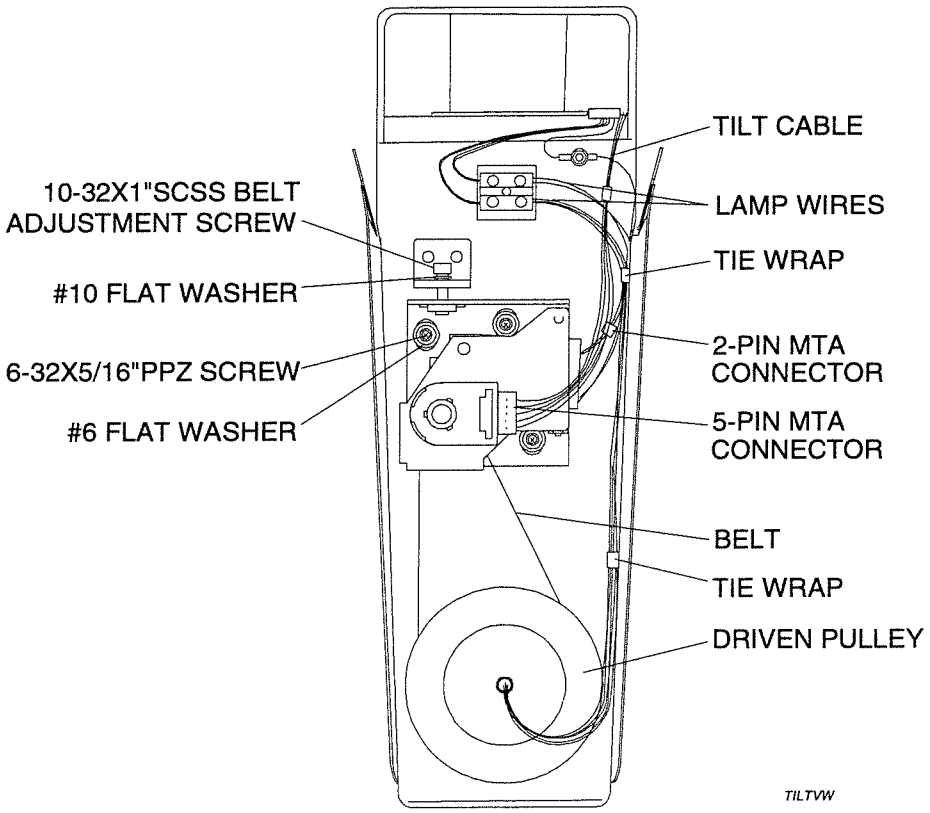


Figure 3-41. Tilt Mechanism Removal and Replacement

Step 4. At top of yoke leg, at terminal strip, disconnect two lamp wires that pass through tilt driven pulley.

WARNING: If lamp wires are white, lamp wires and socket must be replaced with socket having blue wires. White wires may explode causing personnel injury and equipment damage. Refer to Lamp Socket Removal and Replacement paragraph.

Step 5. At ground lug, using 5/16 inch nutdriver, remove 6-32 KEPS nut that secures terminal rings and remove terminal rings.

Step 6. At top of yoke, using 5/32 inch Allen wrench, insert Allen wrench through hole in top of yoke leg and into head of 10-32x1"SCSS tilt mechanism belt tension and adjustment screw and remove screw and #10 flat washer.

Step 7. At tilt mechanism cable assembly, disconnect 5-pin MTA connector from tilt mechanism encoder and 2-pin MTA connector from tilt mechanism motor. Cut cable ties securing wires to mechanism.

Step 8. At tilt mechanism, remove three 6-32x5/16"PPZ screws and #6 flat washers that secure tilt mechanism to yoke leg and remove tilt mechanism.

CAUTION: If tilt mechanism does not have a bead ferrite installed, the luminaire must be fitted with EMI bead ferrites to reduce electronic emissions. Refer to Installing EMI Ferrites paragraph.

Step 9. Replace tilt mechanism by doing Steps 6 through 8 in reverse.

Step 10. Tighten belt tension adjustment screw to tighten belt onto driven pulley. Refer to Pan/Tilt Belt Tension Adjustment paragraph.

Step 11. Re-assemble luminaire by doing steps 2 through 5 in reverse.

3.3.2.4 Tilt Cable Removal and Replacement

Parts:

1 EA CABLE ASSY, VL5 TILT (25-9634-0116)
3 EA CABLE TIE, SMALL .10X4" (55-2186-0001)

Tools:

diagonal cutters

To remove and replace tilt mechanism cable:

Step 1. Remove power to luminaire.

Step 2. At tilt-side leg, remove leg cover.

Step 3. At tilt mechanism cable assembly, disconnect 5-pin MTA connector from tilt mechanism encoder and 2-pin MTA connector from tilt mechanism motor. Cut cable tie securing wires to mechanism.

CAUTION: If tilt mechanism does not have a bead ferrite installed, the luminaire must be fitted with EMI bead ferrites to reduce electronic emissions. Refer to Installing EMI Ferrites paragraph.

Step 4. At board-side leg, remove leg cover.

Step 5. At LCB, disconnect tilt cable 2-pin red MTA connector and 5-pin MTA connector (fitted together with a 7-pos relief cover) from P8.

Step 6. At yoke cross, member cut cable ties securing tilt cable to cable anchors. Remove cable.

Step 7. Install new cable by doing steps 2 thru 6 in reverse. Install new cable ties.

3.3.2.5 Pan Driven Pulley Removal and Replacement

Parts:

1 EA PULLEY, PTA DRIVEN (10-9634-0171)
1 EA COLLET, PTA DRIVEN PULLEY (10-9634-0174)
4 EA NUT, 6-32, ACORN, TREADLOCKING, SS (53-2002-0004)

as needed:

1 EA RING, PAN STOP (10-9634-0175)
1 EA TUBE, VL5 PIGTAIL PAN (10-9634-0155 B)
(NOT IN TEST RACK)

Tools:

Pan pulley installation tool (10-9624-0134)
Screwdriver, Phillips #2
Screwdriver, slotted #1
Diagonal cutters
Wrench, Allen, 5/32 inch

To remove and replace pan driven pulley:

Step 1. Remove power to luminaire.

Step 2. Remove both yoke leg covers.

Step 3. At yoke top cross member, remove four 6-32x5/16"PPZ screws and #6 internal tooth lock washers that secure heat shield to cross member and remove heat shield (**Figure 3-42**).

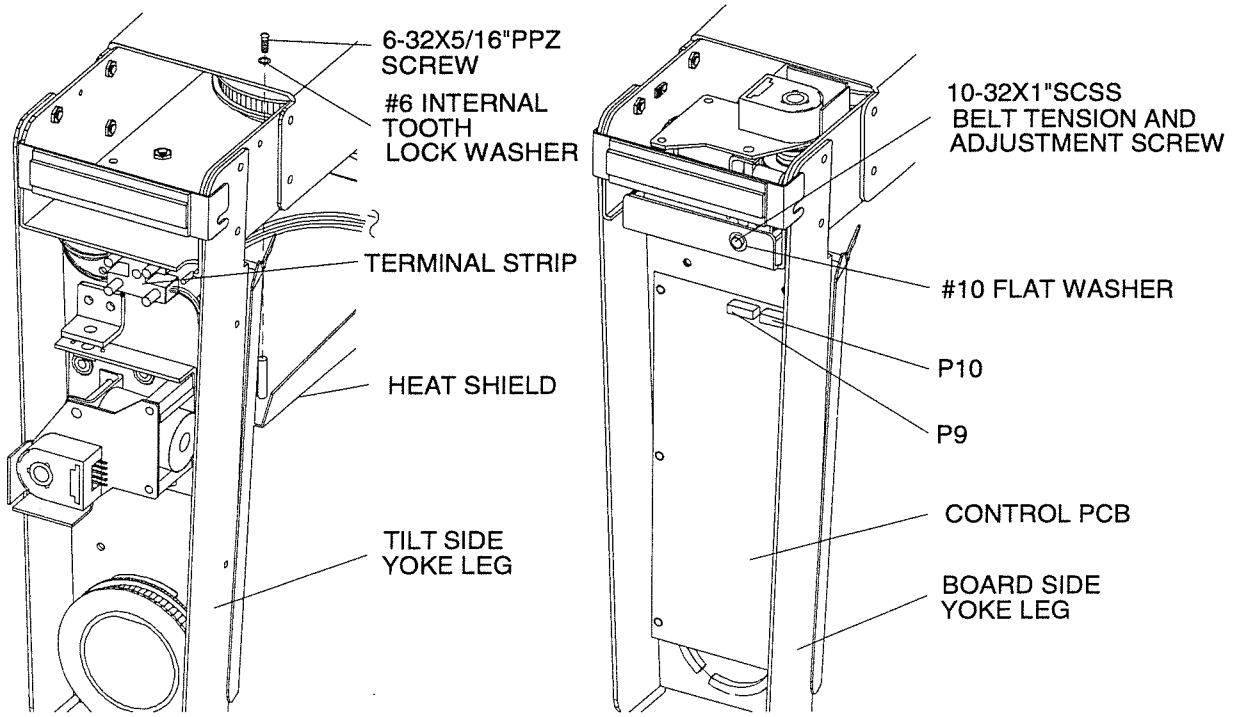


Figure 3-42. Disconnecting Pan Mechanism Wires

Step 4. At tilt-side yoke leg, at terminal strip, disconnect lamp power white and black six-conductor bundle leads. Slide wires through yoke leg. (Lamp wires may remain connected to terminal strip.)

WARNING: If lamp wires are white, lamp wires and socket must be replaced with socket having blue wires. White wires may explode causing personnel injury and equipment damage. Refer to Lamp Socket Removal and Replacement paragraph.

Step 5. At ground lug, using 5/16 inch nutdriver, remove 6-32 KEPS nut that secures ring terminals to ground lug and remove ring terminals.

Step 6. At board-side yoke leg, at top of LCB, disconnect two 2-pin MTA power connectors at P10 and one 4-pin MTA comm connector at P9. Slide wires through yoke leg.

Step 7. Stuff yoke cables up into pan tube to remove from work area.

Step 8. At pan cable assembly, disconnect 5-pin MTA connector from pan mechanism encoder and 2-pin MTA connector from motor wires (**Figure 3-43**). Cut cable ties securing wires to mechanism.

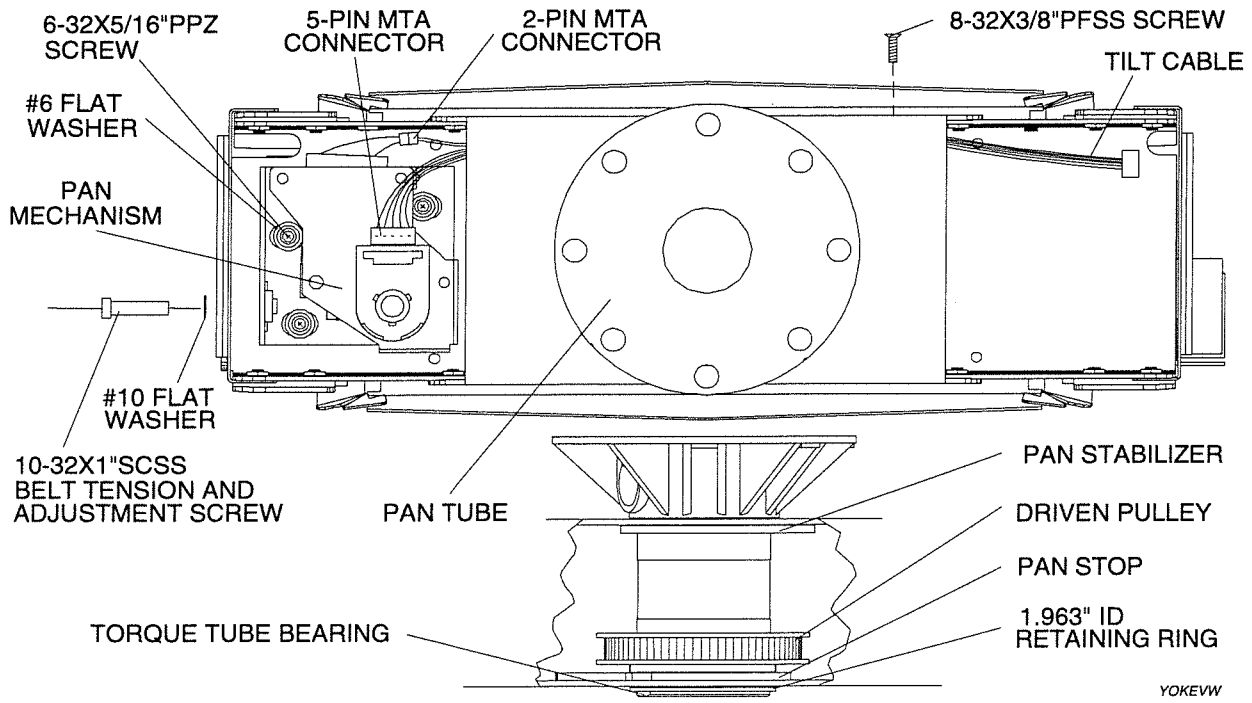


Figure 3-43. Pan Mechanism Removal and Replacement

CAUTION: If pan mechanism does not have a bead ferrite installed, the luminaire must be fitted with EMI bead ferrites to reduce electronic emissions. Refer to Installing EMI Ferrites paragraph.

Step 9. At cross member, remove 12, 8-32x3/8"PFSS screws that secure top cross member to bottom cross member. (Do not remove **VARI*LITE** sticker covering two center screws on one side of top cross member. Remove screws directly through sticker.)

Step 10. At pan mechanism belt tension adjustment screw, using 5/32 inch Allen wrench, remove 10-32x1"SCSS screw and #10 flat washer.

Step 11. At pan mechanism, remove three 6-32x5/16"PPZ screws and #6 flat washers that secure pan mechanism to yoke.

Step 12. Remove pan mechanism from mount and push as close as possible to pan tube.

Step 13. Remove belt from driven pulley.

Step 14. At bottom of pan tube, remove snap ring that secures pan tube to yoke and then remove shim.

Step 15. Remove pan tube/input cable assembly. (Yoke top cross member and torque tube bearing will come out with assembly.)

Step 16. Remove pan stop. (If replacing old style pulley with new pulley and collet assembly, a new pan stop will be installed.) Discard or save as required.

Step 17. At driven pulley, identify whether pulley is secure is place with two setscrews (a), one pan head screw (b), or four acorn nuts (c) secure pulley to pan tube.

a. For single pan head screw, using #1 Phillips screwdriver, remove 6-32x9/16"PPZ screw and #6 internal tooth lockwasher that secure driven pulley to tilt tube and remove pulley from tilt tube (**Figure 3-44**).

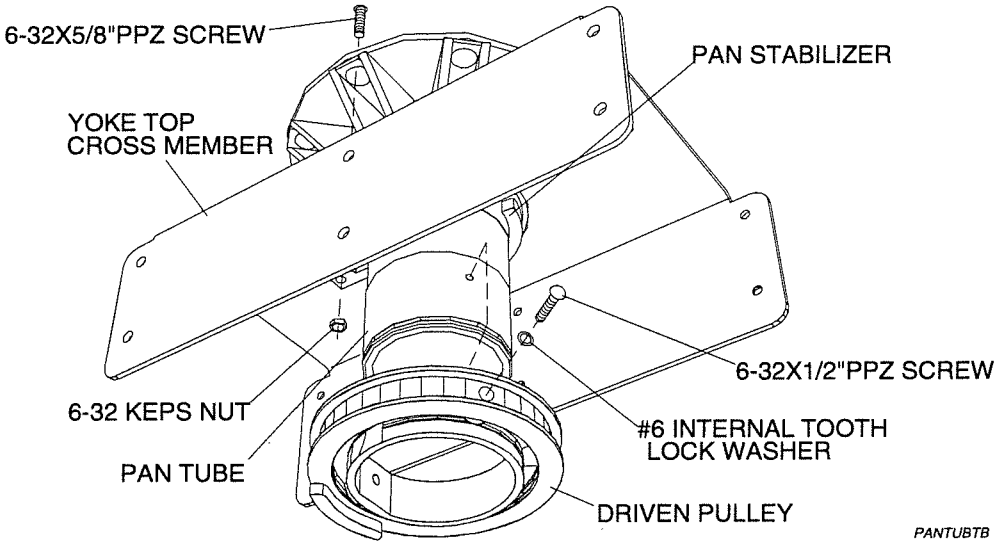


Figure 3-44. Old Style Pulley Removal

b. For setscrews, using 9/16 inch Allen wrench, loosen two setscrews that secure driven pulley to tilt tube, and remove pulley from tilt tube.

c. For four acorn nuts (with collet assembly), using 5/16 inch nutdriver, gradually loosen nuts in cross pattern to prevent pulley from cracking. Loosen until collet and pulley assembly can be removed from tilt tube. (Do not loosen so much that collet and pulley are separated.)

Note: In all cases, the driven pulley should be replaced with the pulley and collet assembly which is the latest luminaire upgrade. These parts must be ordered from the shop before continuing.

Step 18. Install collet on replacement pulley (**Figure 3-45**). Make sure that collet is oriented to match "D" in pulley.

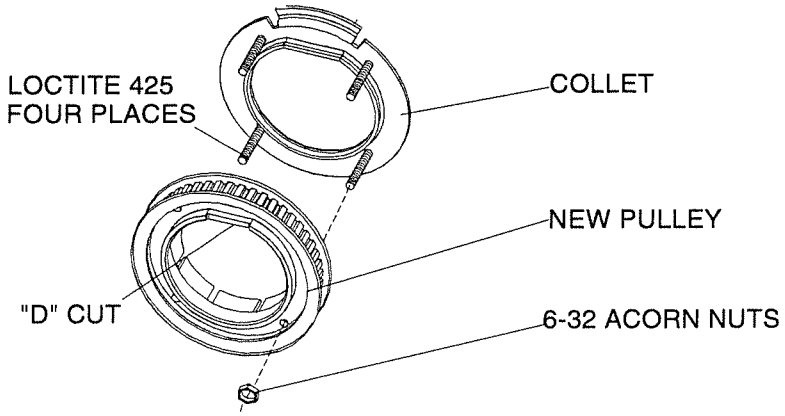


Figure 3-45. Pulley and Collet Assembly

Step 19. Apply Loctite #425 to four threaded studs of collet.

Step 20. Install four threadlocking 6-32 acorn nuts onto studs and tighten slightly to hold pieces together.

Step 21. Slide installation tool onto pan tube opposite flat side as shown in (**Figure 3-46**). Ensure that tab is oriented upwards.

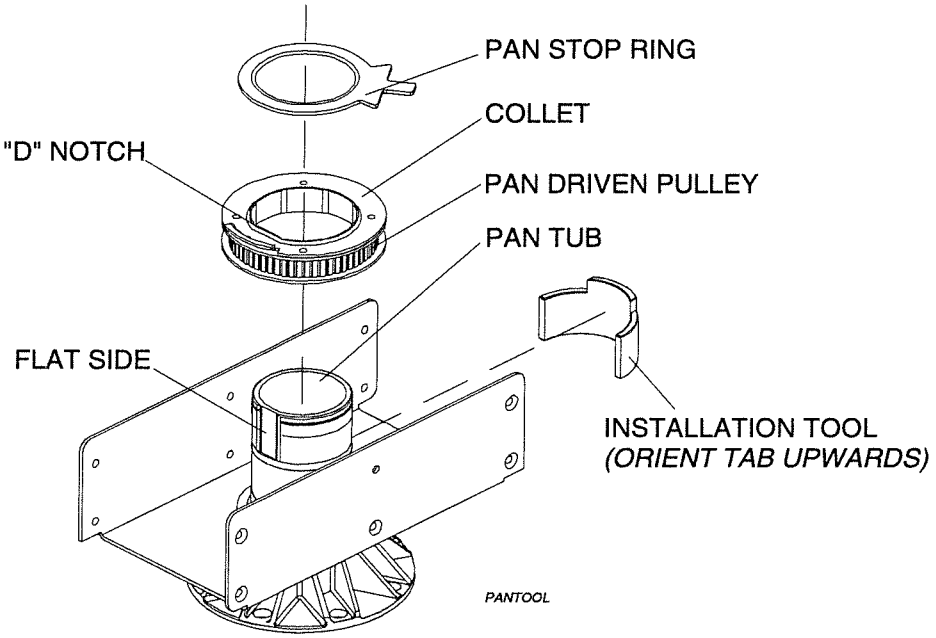


Figure 3-46. Installing Pan Pulley With Installation Tool

Step 22. Matching "D" notch of pulley (and collet) with pan tube flat side, slide pulley down onto pan tube until it rests against installation tool. Collet should be on side of pulley opposite tool (**Figure 3-47**).

CAUTION: Do not overtighten pulley acorn nuts or pulley may crack.

Step 23. Using 5/16 inch open end wrench, fully tighten, but do not overtighten, 6-32 acorn nuts in a *cross pattern* to secure collet and pulley to pan tube.

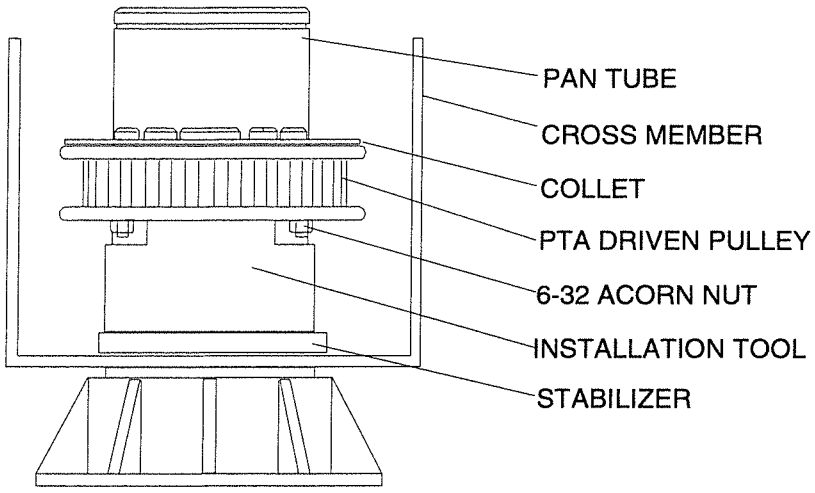


Figure 3-47. Pulley Installation Side View

Step 24. Remove installation tool. Ensure that pulley is secure.

Step 25. Re-install pan tube stop, and re-install yoke top cross member assembly onto luminaire. Make sure that pan stop points towards pan assembly.

Step 26. Replace pan belt on driven pulley.

Step 27. Place shim on pan tube and secure pan tube in place with retaining ring.

Step 28. Secure yoke top cross member in place with 12, 8-32x3/8"PPSS screws. For screws removed through **VARI*LITE** sticker, install screws through holes in sticker. Flat head of screws should secure ragged edges of sticker.

Step 29. Re-install 10-32x1"SCSS pan belt adjustment screw and #10 flat washer and tighten (**Figure 3-43**). Refer to Pan/Tilt Belt Tension Adjustment paragraph.

Step 30. Reconnect lamp power cables to terminal strip.

Step 31. Reconnect ground wire ring terminals to ground lug and secure in place with 6-32 KEPS nut.

Step 32. Reconnect 4-pin comm MTA connector to header at P9 and two 2-pin power MTA connectors to headers at P10.

Step 33. Secure heat shield in place with four 6-32x5/16"PPZ screws.

Step 34. Re-install yoke leg covers.

3.3.2.6 Pan Mechanism Removal and Replacement

Parts:

1 EA ASSY, VL5 PAN/TILT MECHANISM (22-9634-0009)
2 EA CABLE TIE, SMALL .10X4" (55-2186-0001)

Tools:

Screwdriver, Phillips #2
Screwdriver, slotted #1
Diagonal cutters
Wrench, Allen, 5/32 inch

To remove and replace pan mechanism:

Step 1. Remove power to luminaire.

Step 2. Remove both yoke leg covers.

Step 3. At yoke top cross member, remove heat shield by removing four 6-32x5/16"PPZ screws and #6 internal tooth lock washers that secure top heat shield to top cross member.

Step 4. At tilt-side yoke leg, at terminal strip, disconnect lamp power white and black six-conductor bundle leads. Slide wires through yoke leg.

WARNING: If lamp wires are white, lamp wires and socket must be replaced with socket having blue wires. White wires may explode causing personnel injury and equipment damage. Refer to Lamp Socket Removal and Replacement paragraph.

Step 5. At ground lug, using 5/16 inch nutdriver, remove 6-32 KEPS nut that secures ring terminals to ground lug and remove ring terminals.

Step 6. At top of LCB, disconnect two 2-pin MTA connectors at P10 and one 4-pin MTA connector at P9. Slide wires through yoke leg.

Step 7. Stuff yoke cables up into pan tube to remove from work area.

Step 8. At pan cable assembly, disconnect 5-pin MTA connector from pan mechanism encoder and 2-pin MTA connector from motor wires (**Figure 3-44**). Cut cable ties securing wires to mechanism.

CAUTION: If pan mechanism does not have a bead ferrite installed, the luminaire must be fitted with EMI bead ferrites to reduce electronic emissions. Refer to Installing EMI Ferrites paragraph.

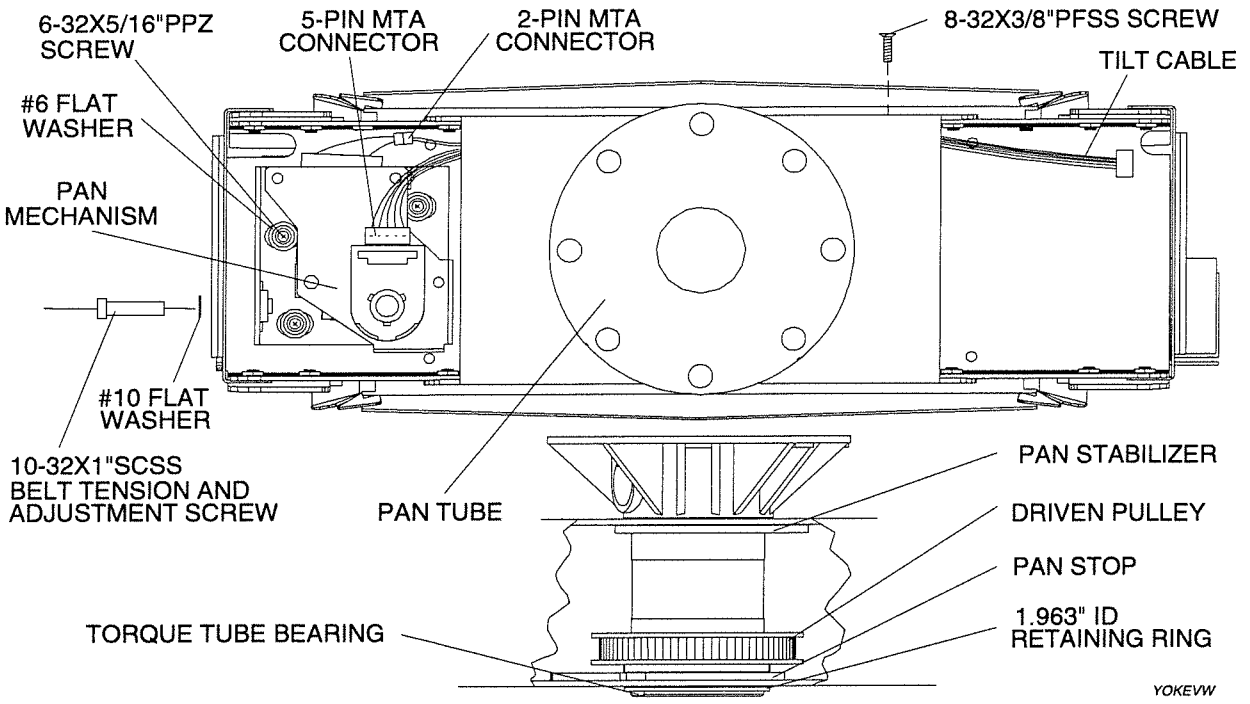


Figure 3-44. Pan Mechanism Removal and Replacement

Step 9. At pan mechanism belt tension adjustment screw, using 5/32 inch Allen wrench, remove 10-32x1"SCSS screw and #10 flat washer.

Step 10. At pan mechanism, remove three 6-32x5/16"PPZ screws and #6 flat washers that secure pan mechanism to yoke.

Step 11. Remove pan mechanism from mount and push as close as possible to pan tube.

Step 12. At bottom of pan tube, remove 1.963" ID retaining ring that secures pan tube to yoke. In addition, also remove shim spacer if present.

Step 13. Without loosening pan pulley, lift pan tube so that there is enough room to remove belt from pulley. Torque tube bearing should remain in place in yoke cross member. Leave pan stop in place.

Step 14. Remove belt from driven pulley and remove pan assembly.

Step 15. Replace pan mechanism by doing Steps 9 through 14 in reverse.

Step 16. Tighten belt tension and adjustment screw to tighten belt onto driven pulley. Refer to Pan/Tilt Belt Tension Adjustment paragraph.

Step 17. Re-assemble luminaire by doing Steps 2 through 8 in reverse.

3.3.2.7 Pan Cable Removal and Replacement

Parts:

1 EA CABLE ASSY, VL5 PAN (25-9634-0117)
2 EA CABLE TIE, SMALL .10X4" (55-2186-0001)

Tools:

diagonal cutters

To remove and replace pan mechanism cable:

Step 1. Remove power to luminaire.

Step 2. At board-side yoke leg, remove yoke leg cover.

Step 3. At pan mechanism cable assembly, disconnect 5-pin MTA connector from pan mechanism encoder and 2-pin MTA connector from pan mechanism motor. Cut cable ties securing wires to mechanism.

CAUTION: If pan mechanism does not have a bead ferrite installed, the luminaire must be fitted with EMI bead ferrites to reduce electronic emissions. Refer to Installing EMI Ferrites paragraph.

Step 4. At LCB, disconnect pan cable 2-pin red MTA connector and 5-pin MTA connector (fitted together with a 7-pos relief cover) from P7.

Step 5. Install new cable by doing steps 2 thru 4 in reverse. Install new cable ties.

3.3.2.8 Terminal Strip Removal and Replacement

Parts:

1 EA TERMINAL STRIP, 300V 12 AWG 20A 2 POS. (52-8295-0002)

Tools:

Screwdriver, Phillips #2
Screwdriver, tweaker

To remove and replace terminal strip:

Step 1. Remove power to luminaire

Step 2. At tilt-side yoke leg, remove yoke leg cover.

Step 3. At terminal strip, disconnect two lamp wires and two black and white power wire bundles.

WARNING: If lamp wires are white, lamp wires and socket must be replaced with socket having blue wires. White wires may explode causing personnel injury and equipment damage. Refer to Lamp Socket Removal and Replacement paragraph.

Step 4. Remove one 6-32x3/4"PPZ screw that secures terminal strip to yoke leg and remove terminal strip. Remove insulator if installed (there is no need to replace it).

Step 5. Replace terminal strip by doing Steps 2 through 4 in reverse.

3.3.2.9 Lamp Control PCB Removal and Replacement

Parts:
as needed:
1 EA PCB ASSY, VL5 (24-9634-0070) (**VL5/VL5B**)
1 EA ELEC. ASSY, VL5Arc Lamp Control Board (23-9647-0009) (**VL5Arc**)

Tools:
None

To remove and replace LCB:

Step 1. Remove power to luminaire.

Step 2. At tilt-side leg, remove leg cover.

CAUTION: Always use anti-static precautions when working with PCBs.

Step 3. At LCB, disconnect the following:

a. 4-pin MTA100 connectors from P1, P2, P3, and P4.

b. 2- and 5-pin MTA connectors (with one 7-position strain relief cover) from P7.

c. 2- and 5-pin MTA connectors (with one 7-position strain relief cover) from P8.

d. 4-pin MTA connector from P9.

e. Two, 2-pin MTA connectors (with one 4-position strain relief cover) from P10.

Step 4. At LCB, firmly grasp handle and pull LCB out from yoke leg, disengaging board from six friction clasps.

Step 5. Replace LCB by doing Steps 2 through 4 in reverse.

3.3.2.10 LCB 5A Fuse Removal and Replacement

Parts:

1 EA FUSE, 5AMP, 19374K, TR5-T TIME LAG (70-3731-0001)

Tools:

Pliers, needle-nosed (as needed)

To remove and replace LCB 5A fuse:

Step 1. Remove power to luminaire.

Step 2. At board-side yoke leg, remove yoke leg cover.

CAUTION: Always use anti-static precautions when working with PCBs.

Step 3. At 5A fuse, pull up on fuse to remove. Needle-nosed pliers may be necessary to hold fuse.

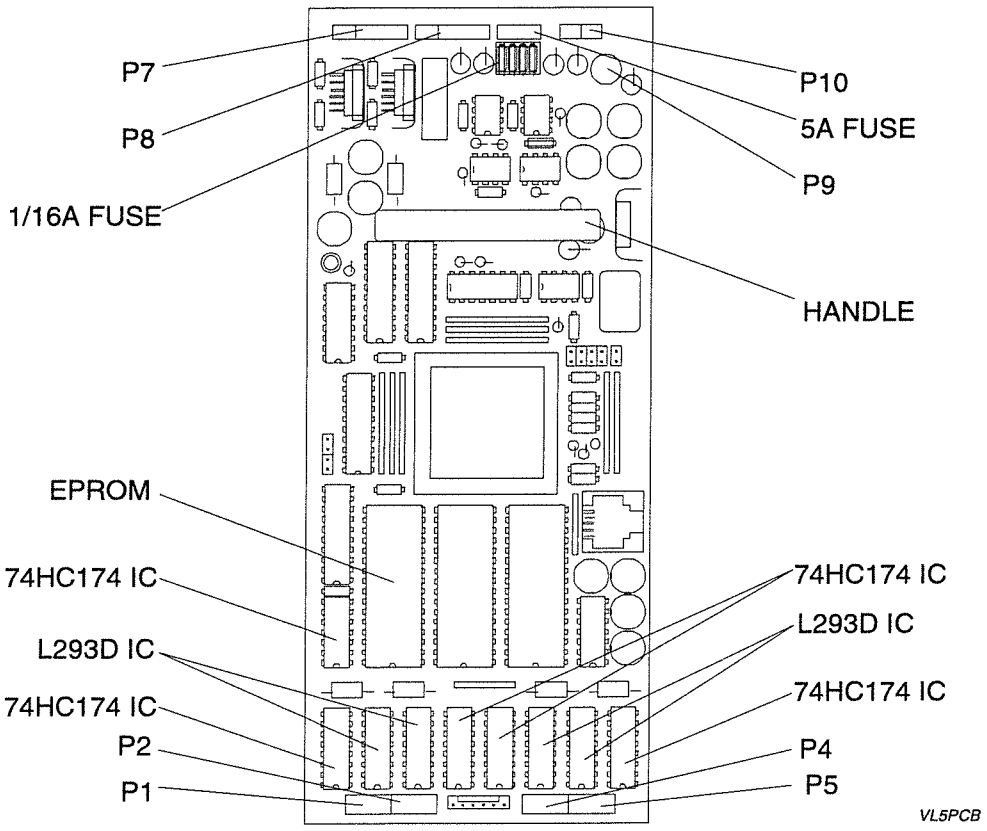


Figure 3-45. *VL5/VL5B* Control Board Replacement Parts Locations

Step 4. Replace fuse by doing Steps 2 and 3 in reverse.

3.3.2.11 LCB 1/16A Fuse Removal and Replacement

Parts:

1 EA ASSY, 1/16A, DATA FUSE (23-9634-0168)

Tools:

Pliers, needle-nosed (as needed)

To remove and replace LCB 1/16A fuse:

Step 1. Remove power to luminaire.

Step 2. At board-side yoke leg, remove yoke leg cover.

CAUTION: Always use anti-static precautions when working with PCBs.

Step 3. Remove 4-pin comm MTA connector from header at P9.

Step 4. At 1/16A fuse mini-board, carefully pull up and out, Data Fuse Assembly (contains four fuses). Needle-nosed pliers may be necessary to pull out of fuse block.

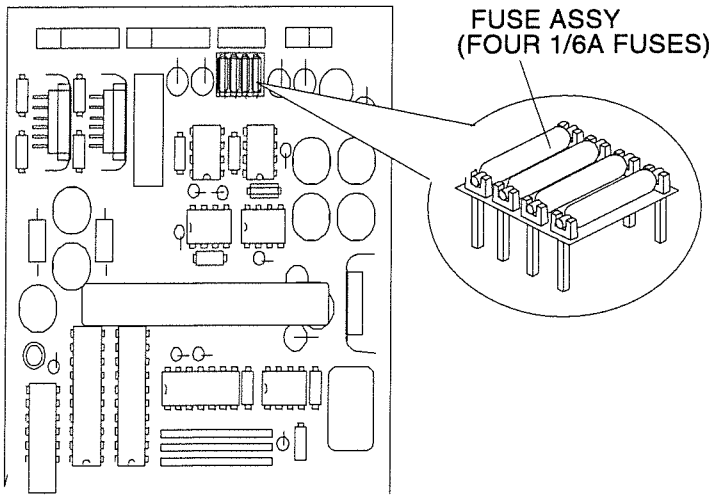


Figure 3-46. LCB 16A Fuse Assembly Removal and Replacement

Step 5. Replace fuse by doing Steps 2 through 6 in reverse.

3.3.2.12 LCB IC and EPROM Removal and Replacement

Parts:

as needed:

1 EA	IC, L293D, QUAD HALF-BRIDGE DRIVER (83-5000-0001)
1 EA	IC, 74HC32, QUAD 2-INPUT OR GATE (84-5000-0004)
1 EA	IC, 74HC174 HEX D-FF W/CLR (84-7407-0174)
1 EA	EPROM,(PGMD:27C010A-10/VL5 18FE) (87-7150-0001)
1 EA	EPROM, PGMD 27C010A-10/VL5Arc v1.0 (87-7159-0001) (**VL5Arc**)

Tools:

IC extractor

To remove and replace PCB IC or EPROM:

Step 1. Remove power to luminaire.

Step 2. At board-side yoke leg, remove yoke leg cover.

Step 3. Identify IC to be removed (**Figure 3-45**).

CAUTION: Always use anti-static precautions when working with PCBs.

Step 4. Using IC extractor, gently pull up on IC and remove from PCB.

Step 5. Replace IC by doing Steps 2 through 4 in reverse.

3.3.2.13 *VL5Arc* Ignitor Board Removal and Replacement

Parts:

1 EA ASSY, VL5Arc IGNITOR BOARD (23-9647-0047)

Tools:

Screwdriver, #2 Phillips
Wrench, open-ended, 7/16 inch

To remove and replace ignitor board:

Step 1. Remove power to luminaire.

Step 2. Remove both yoke leg covers.

Step 3. At yoke top cross member, remove four 6-32x5/16"PPZ screws and #6 internal tooth lock washers that secure heat shield to cross member and remove heat shield (**Figure 3-47**).

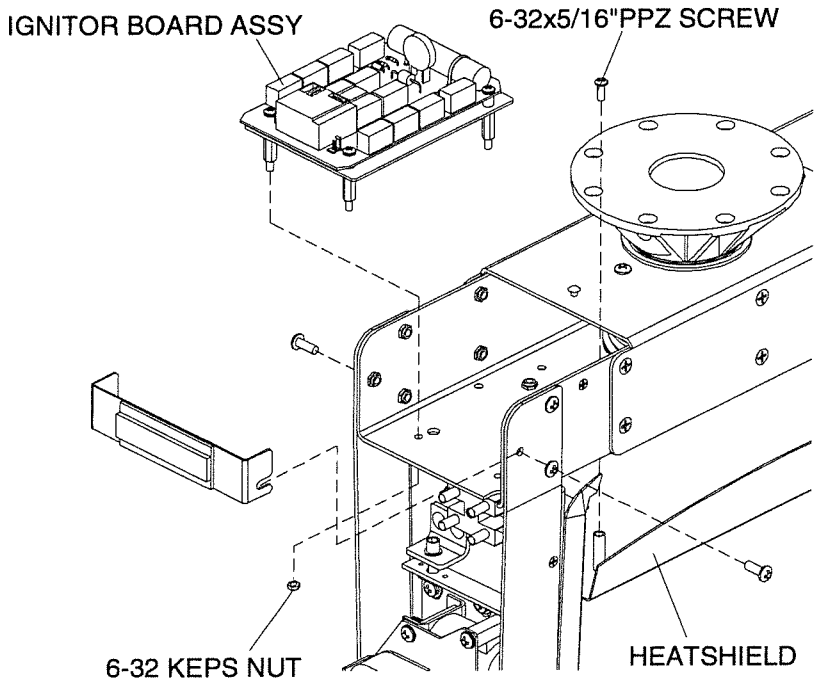


Figure 3-47. *VL5Arc* Ignitor Board Removal and Replacement

Step 4. At yoke cross member, remove four KEPS nut securing ignitor board standoffs to cross member.

Step 5. Disconnect ignitor cable plug housing. Remove ignitor board.

Step 6. Replace ignitor board by doing steps 2 thru 6 in reverse.

3.3.2.14 Input Cable Removal and Replacement

Parts:

1 EA CABLE ASSY, VL5 INPUT W/ GRN-YEL (25-9634-0008)

Tools:

Screwdriver, #2 Phillips
Screwdriver, #1 slotted
Nutdriver, 5/16 inch
Channel locks

To remove and replace input cable:

Step 1. Remove power to luminaire.

Step 2. Remove both yoke leg covers.

Step 3. At yoke top cross member, remove four 6-32x5/16"PPZ screws and #6 internal tooth lock washers that secure heat shield to cross member and remove heat shield.

Step 4. At tilt-side yoke leg, at terminal strip, disconnect lamp power white and black six-conductor bundle leads. Slide wires through yoke leg. (Lamp wires may remain connected to terminal strip.)

WARNING: If lamp wires are white, lamp wires and socket must be replaced with socket having blue wires. White wires may explode causing personnel injury and equipment damage. Refer to Lamp Socket Removal and Replacement paragraph.

Step 5. At ground lug, using 5/16 inch nutdriver, remove 6-32 KEPS nut that secures ring terminals to ground lug and remove ring terminals.

Step 6. At board-side yoke leg, at top of LCB, disconnect two 2-pin MTA power connectors at P10 and one 4-pin MTA comm connector at P9. Slide wires through yoke leg.

Step 7. At input cable, using channel locks, remove compression nut of Kellems cord grip from aluminum threads. Pull all input cable wires thru pan tube and out of mounting hole (**Figure 3-48**).

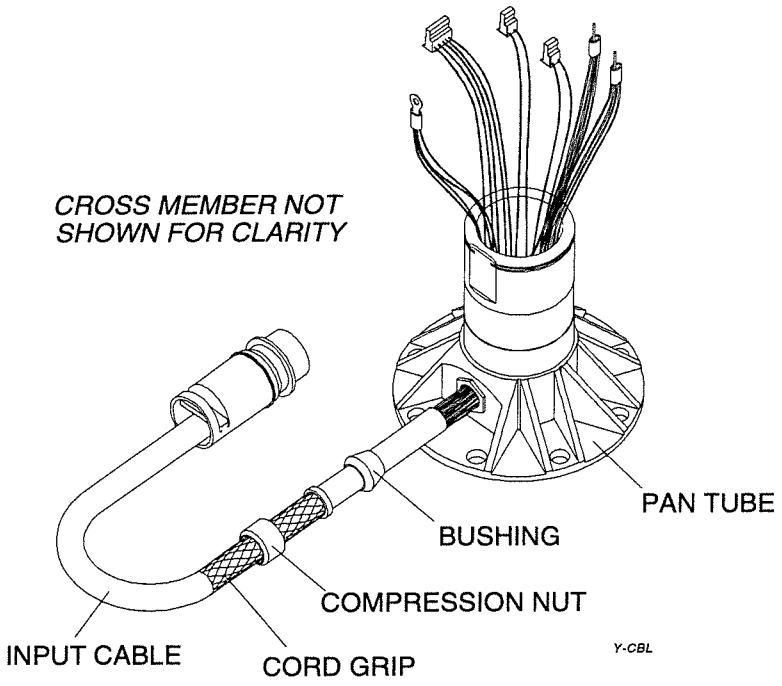


Figure 3-48. Input Cable Removal and Replacement

Step 8. Remove ferrite from old input cable.

CAUTION: If input cable does not have a bead ferrite installed, the luminaire must be fitted with EMI bead ferrites to reduce electronic emissions. Refer to Installing EMI Ferrites paragraph.

Step 9. Pass wires of new input cable thru pan tube mounting hole and route into pan tube.

Step 10. Feed cable into pan tube until gray jacket is visible in pan tube liner 1/16"-1/8" (when looking down into tube).

Step 11. Using channel locks, tighten compression nut until it reaches end of threads.

Step 12. Re-install ferrite on cable.

Step 13. Reconnect wires and replace heatshield (steps 2 thru 6 in reverse).

3.3.2.15 Input Cable Connector Removal and Replacement

Parts:

1 EA RECEPT, CPC 17-16, STD SEX (52-6400-0015)

Tools:

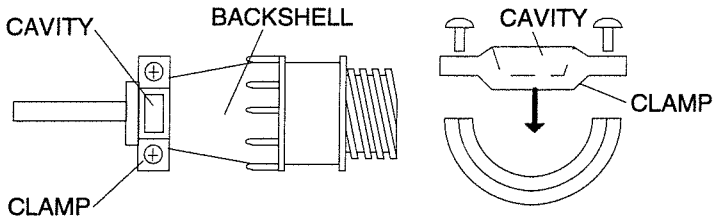
Tool, AMP contact insertion, extraction (07-4001-0003)
Channels locks (2 pair)

To remove and replace input cable CPC 17-16 connector:

There are two types of unshielded (**VL5**) lamp cable backshells that have been used. The older type is similar to the **Series 200** lamp cable in that the backshell has a screw-down clamp to hold the backshell onto the cable. The newer style is like the shielded (**VL6**) lamp cable in that the backshell is secured to a screw-on cable retaining ring.

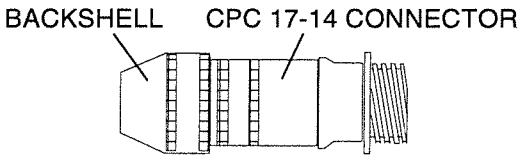
Step 1. Disassemble connector:

a. For older-style, screw-down cable clamp lamp cables, do the following.
   1. At cable clamp/backshell, loosen two screws that secure cable clamp/backshell to lamp cable.



   2. Unscrew cable clamp/backshell from connector and slide cable clamp/backshell away from connector so that wires are exposed.

b. For newer-style, screw-on cable retaining ring lamp cables, do the following.
   1. At cable clamp/backshell, unscrew retaining ring cable clamp and separate from backshell.
   2. Slide cable clamp/backshell away from connector so that wires are exposed.



Step 4. Using AMP pin removal tool, remove all pins from connector.

Step 5. At replacement connector, install pins using following pinouts:

Pin	Wire
1	Black
2	Black
3	N/C
4	Red (gold contact pin)
5	Black (gold contact pin)
6	Green
7	Red
8	N/C
9	N/C
10	Shield (gold contact pin)
11	N/C
12	White (gold contact pin)
13	Green (gold contact pin)
14	Green
15	White
16	White

CAUTION: To avoid damaging cable connectors and to ease future repairs, do not apply Loctite 242 to either clamp/shell or connector.

Step 6. Re-assemble connector:

a. Thread cable clamp/backshell on connector.

b. Using two pairs of channel locks, tighten cable clamp/backshell to connector so that it cannot be unscrewed by hand.

c. Thread cable clamp onto backshell and securely tighten.

3.3.2.16 Input Cable Connector Pin Removal and Replacement

Parts:

1 EA PIN, TIN 18-16AWG CRIMP (LOOSE) TYPE 3+ (52-8276-0001)

1 EA PIN, GOLD 24-20AWG (LOOSE) TYPE 3+ (52-8277-0001)

Tools:

Tool, AMP contact insertion, extraction (07-4001-0003)
Crimp tool, AMP (07-4003-0001)
Crimp tool, Pyle-National (07-4002-0004)
Diagonal cutters
X-acto knife
Screwdriver, Phillips #1

Step 1. Disassemble connector. Refer to Input Cable Connector Removal and Replacement paragraph.

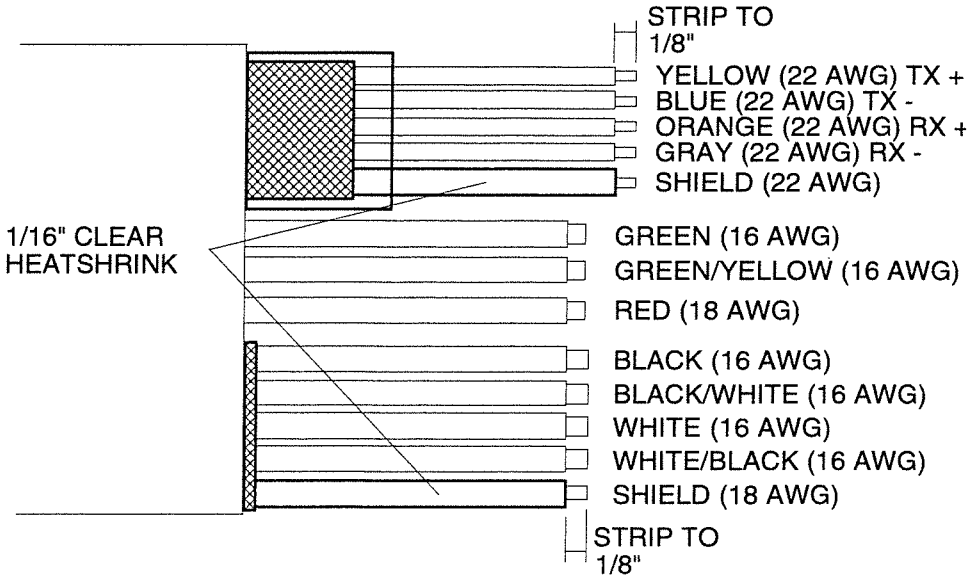
Step 2. Remove broken contact.

a. Using AMP contact insertion/extraction tool, remove broken contact from insert.

Step 3. Install replacement contact on conductor.

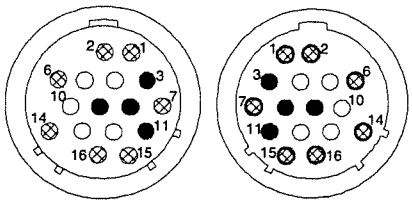
a. Using diagonal cutters, cut conductor to make it even.

b. Strip conductor insulation (and clear heatshrink for data shield) 1/8 inch.



c. Using crimper, crimp contact to conductor.
   1. Crimp 22 AWG gold contact to data wires.
   2. Crimp 16 AWG tin contact to AC wires.

Step 4. Insert replacement contact into receptacle using the following pinout:



PIN	WIRE	COLOR	TYPE
1	18 AWG	BLK	DIMMER LINE 1
2	18 AWG	BLK/WHT	DIMMER LINE 2
3	OPEN		
4	22 AWG	YEL	TX+
5	22 AWG	BLU	TX-
6	18 AWG	GRN	DIMMER GND 1
7	18 AWG	RED	+24V
8	OPEN		
9	OPEN		
10	22 AWG	DRAIN	DATA DRAIN
11	OPEN		
12	22 AWG	ORG	RX+
13	22 AWG	GRY	RX-
14	18 AWG	GRN/YEL	DIMMER GND 2
15	18 AWG	WHT	DIMMER NEUT 1
16	18 AWG	WHT/BLK	DIMMER NEUT 2

CAUTION: To avoid damaging cable connectors and to ease future repairs, do not apply Loctite 242 to either clamp/shell or connector.

Step 5. Re-assemble cable backshell.

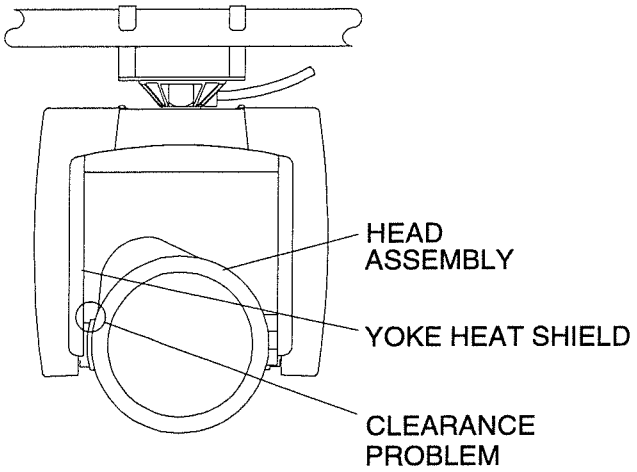
a. For screw-down cable clamp lamp cable
   1. Thread cable clamp/backshell on connector.
   2. Using two pairs of channel locks, tighten cable clamp/backshell to connector so that it cannot be unscrewed by hand.
   3. Correctly orient cable clamp onto cable and backshell. Ensure cavity in clamp is oriented upward and section of clamp with larger block is oriented downward. Large block holds connector to cable securely.
   4. Secure cable clamp to backshell using two screws (that come with cable clamp/backshell).

a. For screw-on cable clamp lamp cable
   1. Thread cable clamp/backshell on connector.
   2. Using two pairs of channel locks, tighten cable clamp/backshell to connector so that it cannot be unscrewed by hand.
   3. Thread cable clamp onto backshell and securely tighten.

3.3.3 Miscellaneous Maintenance

3.3.3.1 Correcting Heatshield Interference

An undetermined number of **VL5** luminaires may have an interference problem between the Yoke Heat Shield and the Head assembly. This interference is caused by an incorrect screw installed on the Pan/Tilt Stabilizer. The screw that secures the pan/tilt stabilizer has been used to secure the terminal block and vise versa. The screw that should be used on the pan/tilt stabilizer is a 6-32x1/2" PPZ and the screw that secures the terminal block is a 6-32x3/4" PPZ.



Parts:
none

Tools:
Screwdriver, #2 Phillips

To correct an interference problem:

Step 1. Remove power from luminaire.

Step 2. Remove both yoke leg covers from luminaire.

Step 3. At tilt-side leg, use screwdriver to remove screw securing the terminal block to leg (**Figure 3-49**). Compare this screw to **Figure 3-51.** The correct screw for this location is a 6-32x3/4" PPZ.

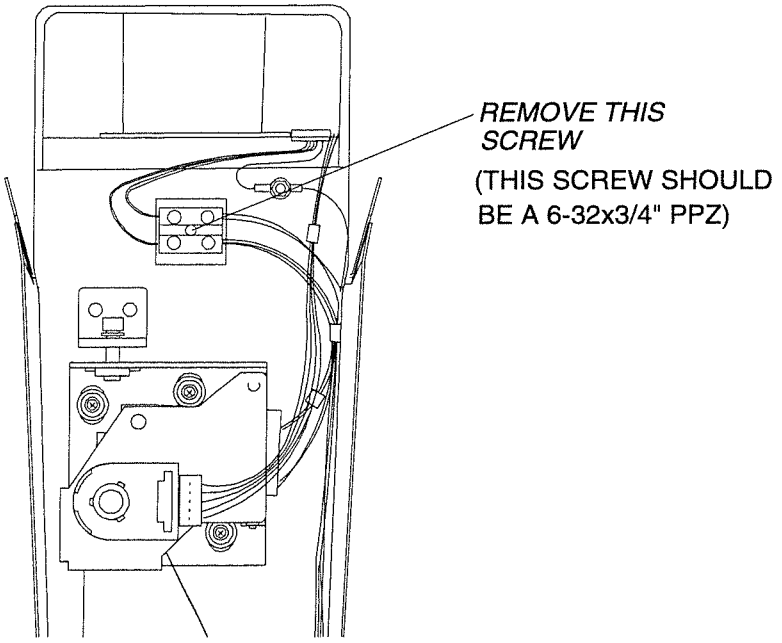


Figure 3-49. Tilt side Leg (*Head Not Shown*)

Step 4. At board-side leg, use screwdriver to remove screw securing pan/tilt stabilizer to leg (**Figure 3-50**). If screw is longer than 1/2 inch, it is pushing the heat shield into the luminaire head assembly. Compare screw to **Figure 3-51**. The correct screw for this location is a 6-32x1/2″ PPZ.

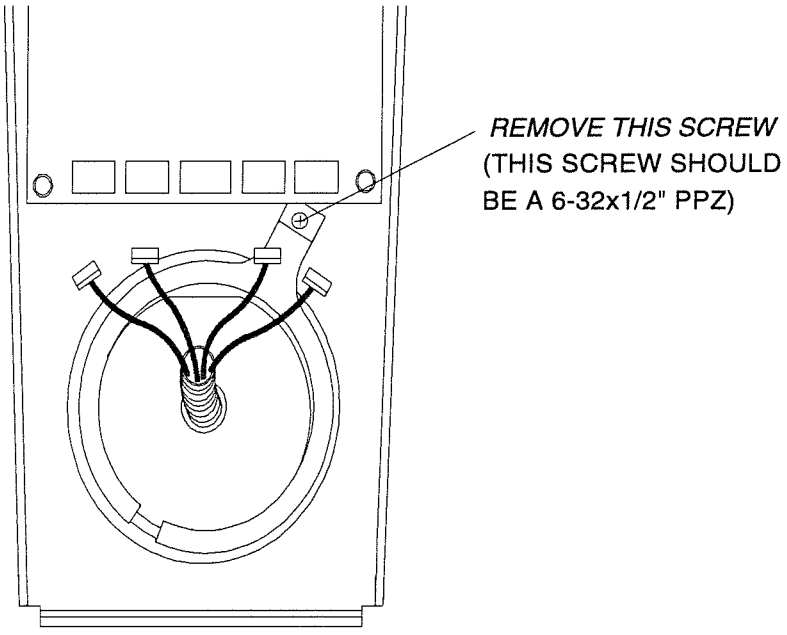


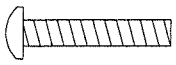
Figure 3-50. Pan/tilt Stabilizer Leg (head not shown).

Step 5. At pan/tilt stabilizer leg, secure pan/tilt stabilizer with 6-32x1/2″ PPZ.

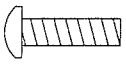
Step 6. At terminal block leg, secure terminal block with 6-32x3/4″ PPZ screw.

Step 7. Check clearance between head assembly and heat shield. If the two continue to touch, carefully push the heat shield away from head.

Step 8. Replace yoke leg covers.



6-32x3/4" PPZ



6-32X1/2" PPZ

Figure 3-51. Screw Chart (Scale: 1=1)

3.3.3.2 Installing EMI Ferrites

CAUTION: If pan mechanism, tilt mechanism, or input cable does not have a bead ferrite installed, the luminaire must be fitted with EMI bead ferrites to reduce electronic emissions for CE compliance.

Parts:

3 EA FERRITE, EMI BEAD, 0.748ID (67-4008-0001)
3 EA CABLE TIE, SMALL .10X4" (55-2186-0001)

Tools:

Screwdriver, Phillips #2
Nutdriver, 5/16 inch

To install ferrites:

Step 1. Remove power to luminaire.

Step 2. Remove both yoke leg covers.

Step 3. At tilt mechanism motor, disconnect red MTA wire connector ends.

Step 4. Pass motor side wires and connector through center of ferrite and wrap around two times (**Figure 3-52**).

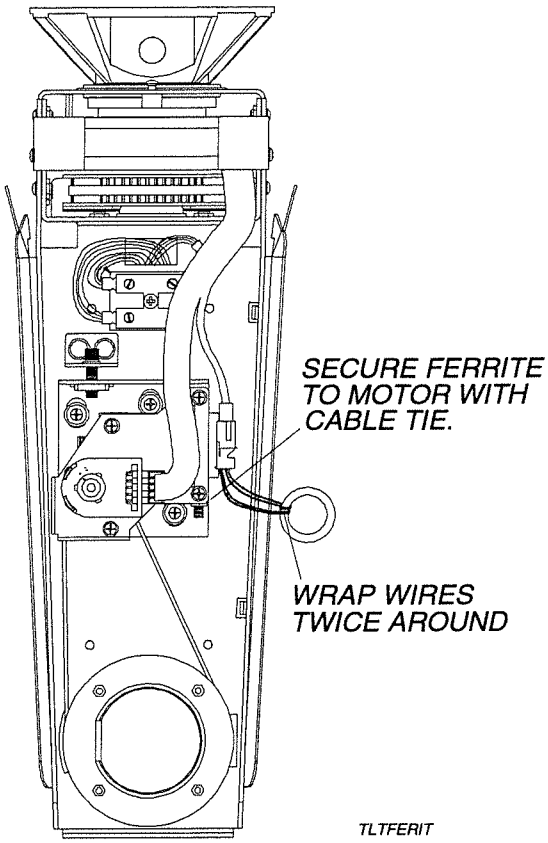


Figure 3-52. Tilt Motor Wire Ferrite Installation

Step 5. Reconnect red MTA connector ends.

Step 6. Dress and secure wires and ferrite to servo motor with one small cable tie. Once installed, the ferrite must not rattle against servo motor or yoke leg.

Step 7. At pan mechanism motor, disconnect red MTA connector ends.

Step 8. Pass wires and connector through center of ferrite and wrap around two times (**Figure 3-53**).

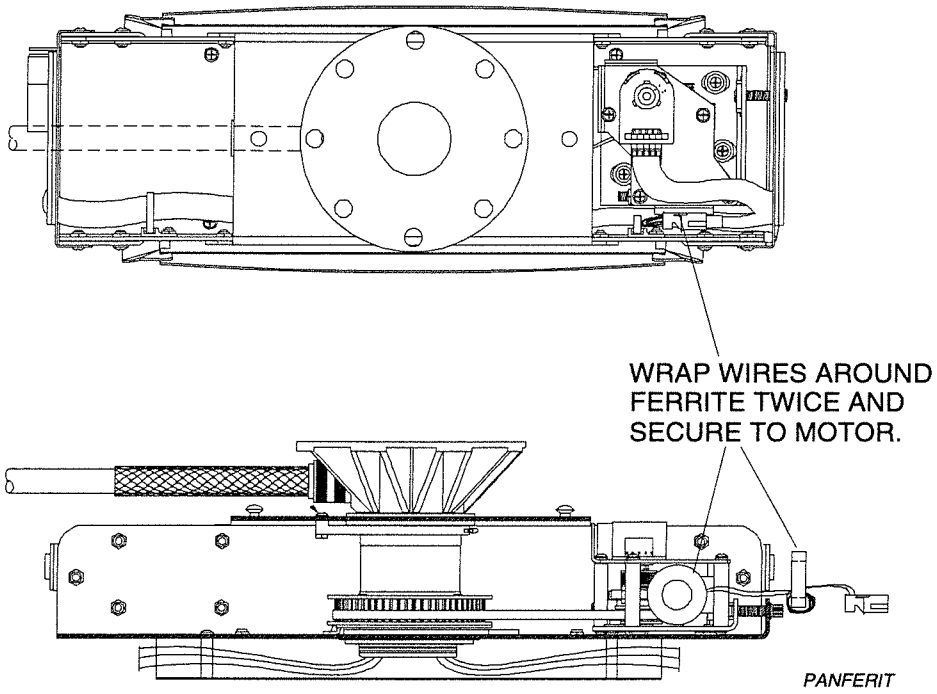


Figure 3-53. Pan Motor Wire Ferrite Installation

Step 9. Reconnect red MTA connector ends.

Step 10. Secure ferrite and wires to servo motor with one cable tie. Ferrite must not rattle against luminaire.

Step 11. At yoke top cross member, remove four 6-32x5/16"PPZ screws and #6 internal tooth lock washers that secure heat shield to cross member and remove heat shield.

Step 12. At tilt-side yoke leg, at left side of terminal strip, disconnect lamp power white and black six-conductor bundle leads. Slide wires through yoke leg.

Step 13. At ground lug, using 5/16 inch nutdriver, remove 6-32 KEPS nut that secures ring terminals to ground lug and remove ring terminals.

Step 14. At top of LCB, disconnect two 2-pin MTA power connectors at P10 and one four-pin MTA comm connector at P9.

Step 15. Slide wires through yoke leg.

Step 16. Group wires together and pass wire ends through center of ferrite and wrap around to form one loop. Position ferrite inside yoke tube. **Figure 3-54**.

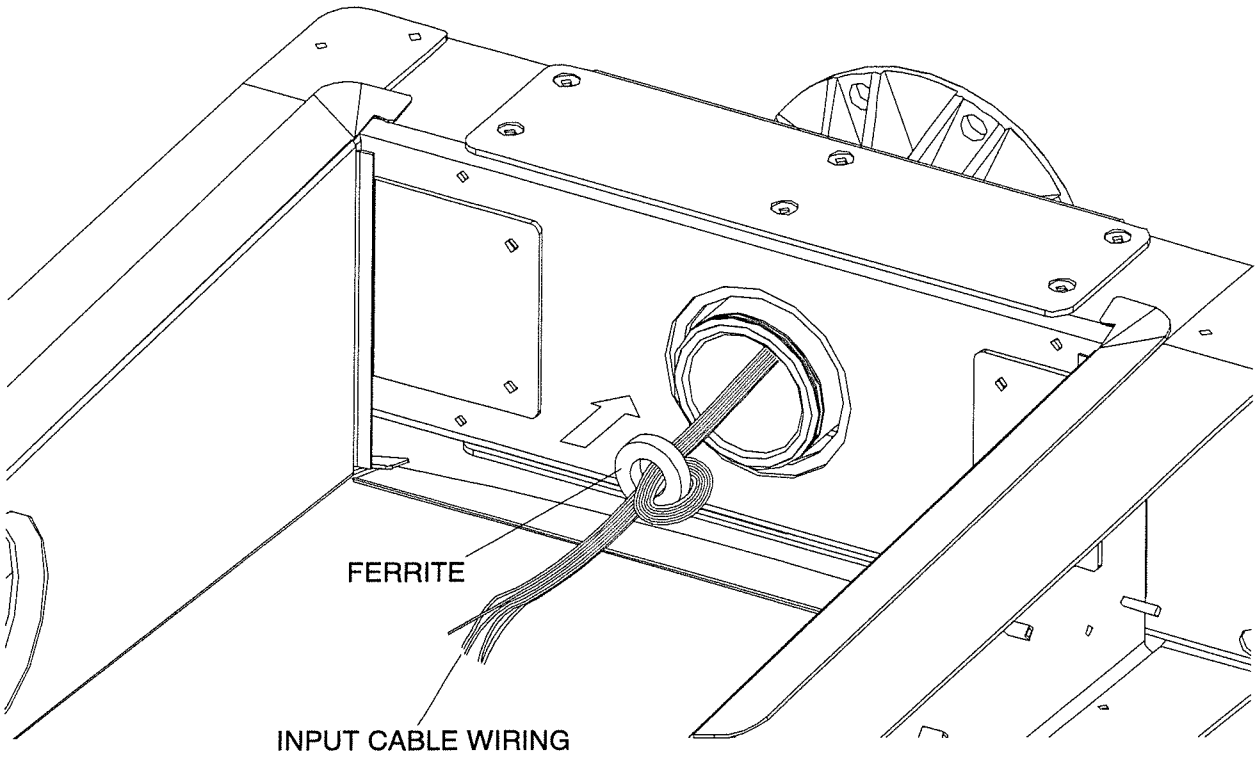


Figure 3-54. Yoke Wire Ferrite Installation

Step 17. Reconnect wires to appropriate locations.

Step 18. At yoke top cross member, secure heat shield to cross member with four 6-32x5/16"PPZ screws and #6 internal tooth lock washers.

Step 19. Replace yoke leg covers.

3.3.3.3 Color Filter and Reflector Cleaning

Supplies:
Glass cleaner
Cotton balls

Step 1. Access reflector or filter set to be cleaned. Refer to Color Filter Removal and Replacement paragraph.

Step 2. Using cotton balls, carefully clean dust, dirt, or other foreign materials from surface with glass cleaner.

3.3.3.4 Color Motor Lubrication

Supplies:
USE ONLY
Versilube, Hi-temp #321 (VL part # 06-6027-0002)

CAUTION: The **VL5** luminaire color motors are lubricated as part of manufacturing assembly. The color motors do not require lubrication as part of regular maintenance. However, if it should become necessary to lubricate a color motor, DO NOT USE the yellow colored Versilube #322.

Step 1. Access motor to be lubricated. Refer to Linear Actuator Assembly Removal and Replacement paragraph.

Step 2. Apply Hi-temp Versilube #321 to drive shaft of motor.

3.3.3.5 *VL5Arc* Lens Cleaning and Fluid Level Check

Supplies:
Glass cleaner
Soft cloth

Step 1. Using glass cleaner and soft cloth, clean both sides of lens.

Step 2. Allow luminaire to warm up at least 30 minutes with positive pressure on lens (bellows drive shaft all the way in).

Step 3. Drive bellows shaft back out.

Step 4. At latch rail, open front latch and swing open nose ring.

Step 5. Check for the following:

a. Lens should expand enough to make the inside surface of lens look and feel smooth.

b. Lens honeycombs should not be convex, but may be slightly concave. (It is easier to determine by touching the lens.)

3.3.3.6 Where To Use Loctite Products

The following is a list of the places where Loctite products are used in **VL5** luminaires. It is important to remember that Loctite is to be used **only** in the applications listed below. Unapproved use of Loctite products can cause equipment failures.

Loctite 242 (06-6008-0001)

1. Used on screws securing linear actuator motors to actuator mount.
2. Used on screws that secure pan/tilt mechanism to tilt side leg and bottom cross member.
3. Used in standoffs in yoke leg and top cross member heatshields that secure heat shields.

Loctite 272 (06-6009-0050)

1. Used on ends of drive ring pins before inserting in drive ring.
2. Used on end of setscrew in drive ring.
3. Used on smaller threads of linear actuator shaft where it enters drive ring link.
4. Used on screws securing center hub assembly to **VL5** bulkhead.
5. Used on screws securing light baffle assembly to **VL5** bulkhead.
6. Used on screws securing heatsink cap to heatsink.

Loctite 425 (06-6008-0003)

1. Tilt mechanism driven pulley attachment screw.
2. Used on screws securing Maxon motor mount to motor.
3. Used on clutch assembly standoffs at ends that secure top plate to standoffs.

Loctite 567 (06-6010-0050)

1. Used on screws securing tilt axis tube to hinge side rail.
2. Used on screws securing tilt axis tube to latched side rail.
3. Used on threads of aluminum body (comes with KELLEMS cord grip) where it enters hole in base of pan tube.
4. Used on screws securing linear actuator motor assembly heatshields to bulkheads.
5. Used on screws securing lamp wire plate to hinged side rail.
6. Used on screws securing light baffles to standoffs.

Loctite 680 (06-6008-0002)

1. Used inside worm attached to Maxon motor and setscrew.

Chapter 4. Illustrated Parts Breakdown

This chapter contains a complete illustrated parts breakdown for the **VL5**, **VL5Arc**, and **VL5B** luminaires. All parts are identified by their Vari-Lite part number and name for the purpose of identification and ordering. This chapter is divided into the following sections:

4.1 Drawing Trees: **VL5**, **VL5Arc**, and **VL5B** Luminaires

4.2 Illustrated Parts

Note: All parts for each sub-assembly are listed in part number order. Parts are identified on the corresponding illustration by item numbers. If a part is used multiple times in different places, the quantity is noted next to the illustration item number.

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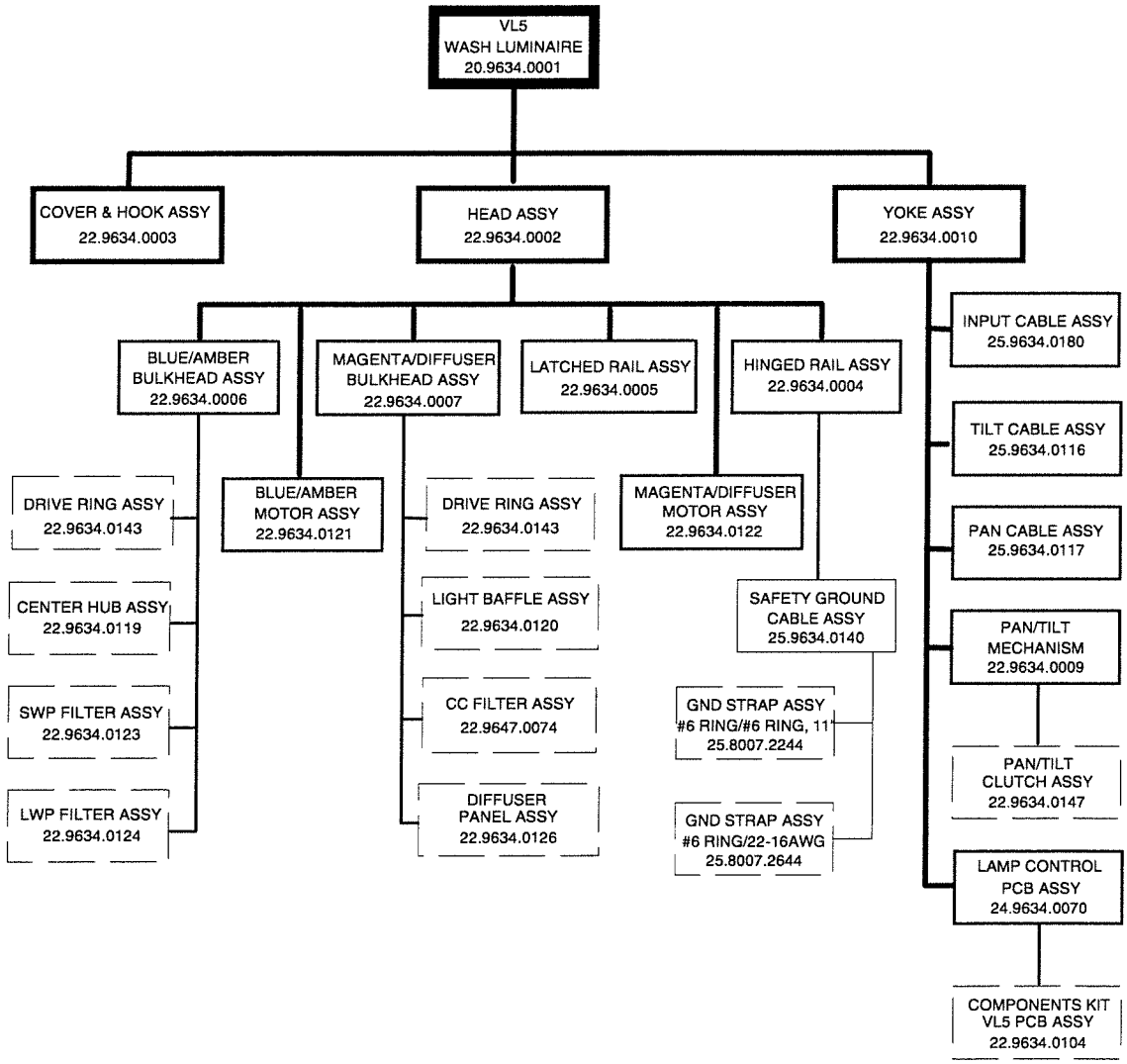
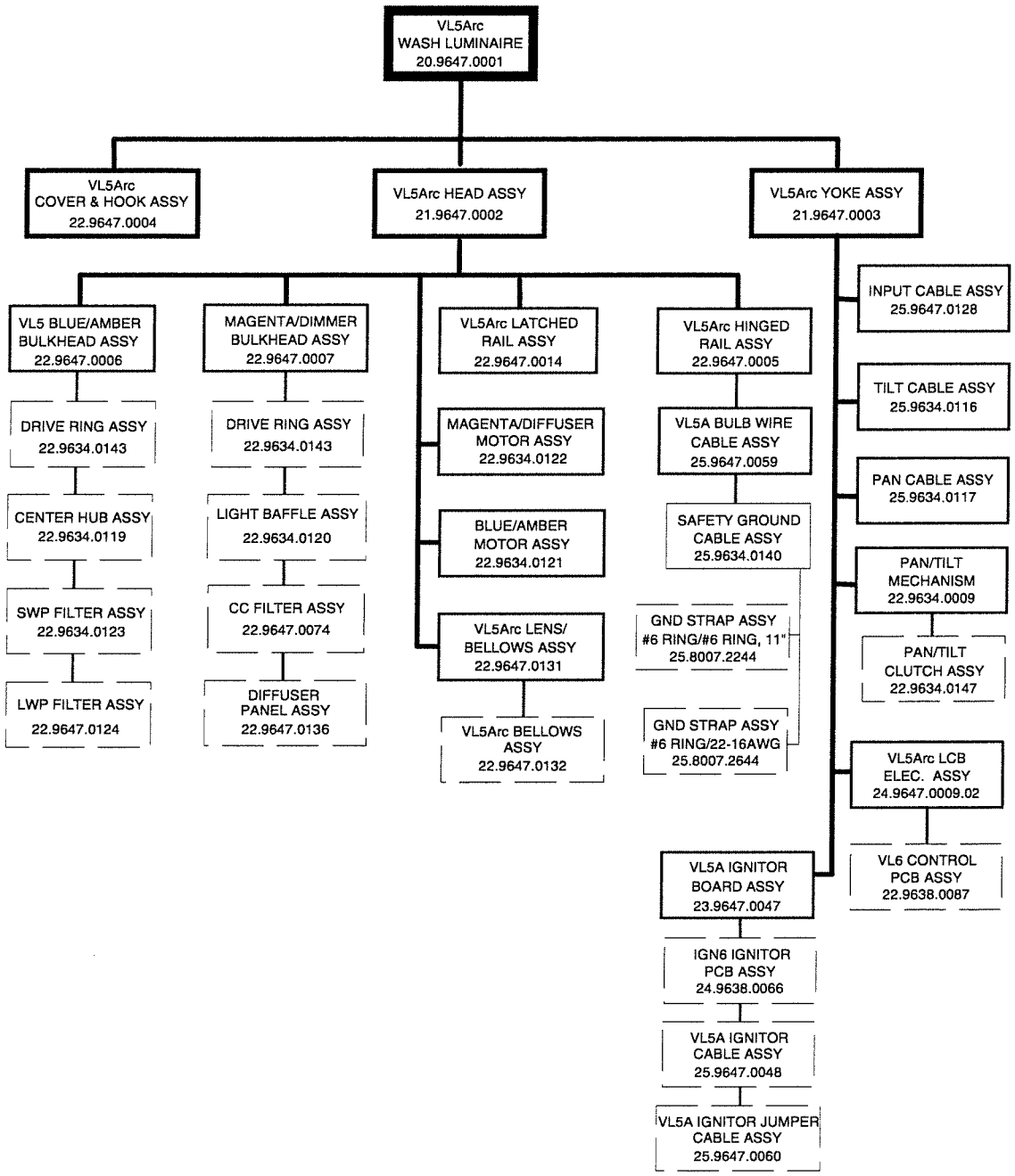
4.1 Drawing Trees

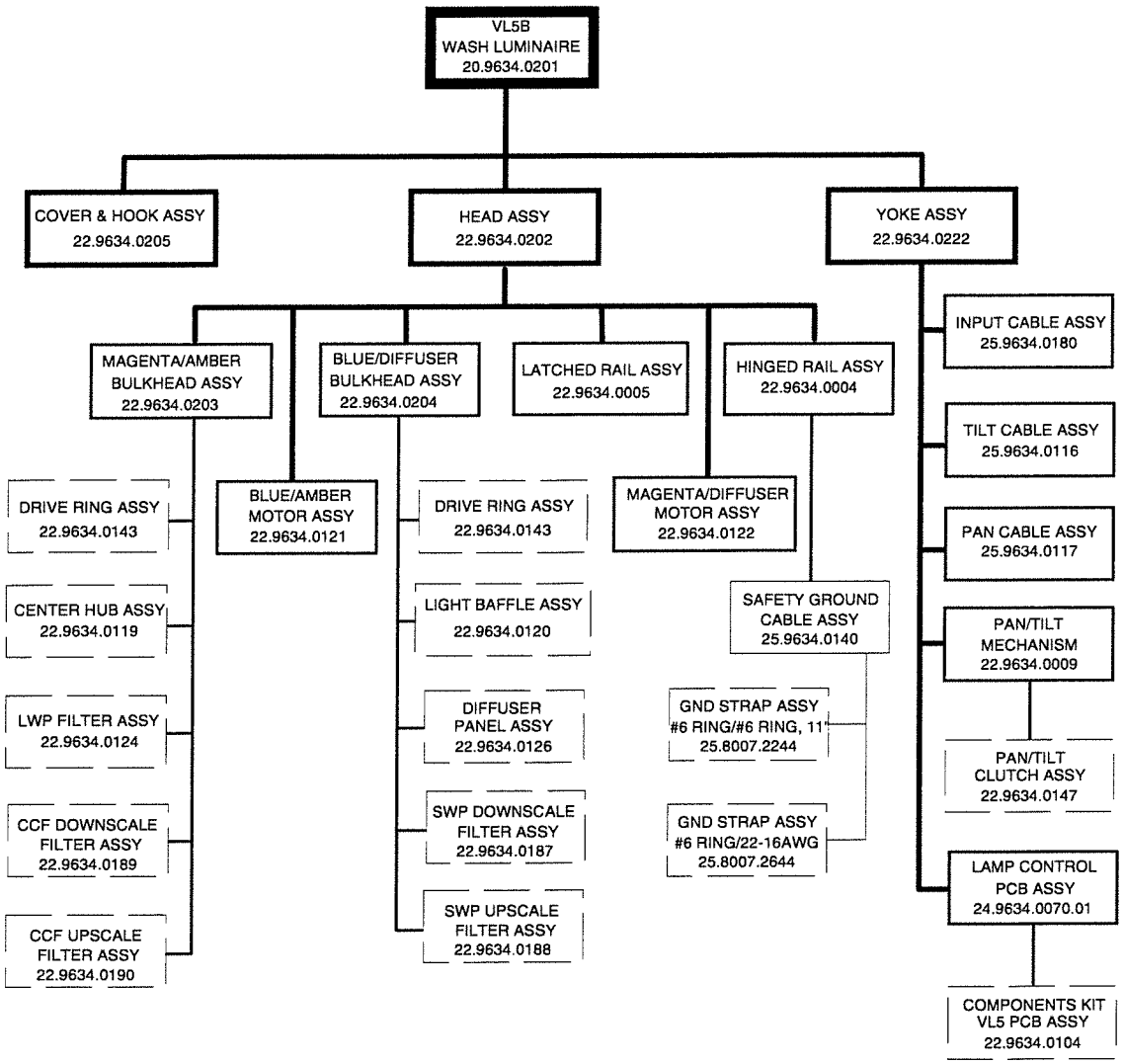
4.1.1 *VL5* Wash Luminaire (20.9634.0001)



4.1.2 *VL5Arc* Wash Luminaire (20.9647.0001)



4.1.3 *VL5B* Wash Luminaire (20.9634.0201)

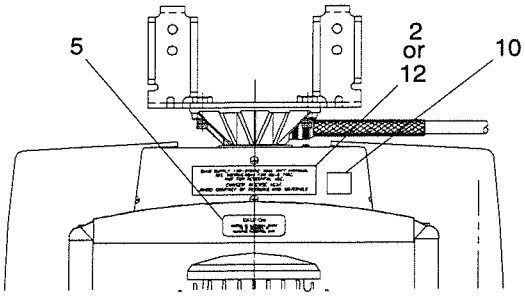


4.2 Parts Breakdown

4.2.1 Assy, *VL5, VL5B, VL5Arc* Covers and Hook 22.9634.0003 (*VL5*) 22.9634.0205 (*VL5B*) 22.9647.0004 (*VL5Arc*)

Parts for all **VL5** luminaires

NO.	PART NO.	QTY VL5	QTY VL5B	QTY VL5Arc	DESCRIPTION
1	04.3001.0005	1 EA	1 EA	-	LABEL, VL5 ID TAG (PAT. & TRADE.)
2	04.3001.0006	1 EA	1 EA	-	LABEL, VL5 INPUT RATING
3	04.3001.0007	1 EA	1 EA	-	LABEL, VL5 RELAMPING (Not shown. On heatsink latch.)
4	04.3001.0008	1 EA	1 EA	1 EA	LABEL, VL5 UL LISTED
5	04.3001.0010	1 EA	-	-	LABEL, CAUTION HAZARD OF ELEC SHK.
6	04.3001.0011	1 EA	1 EA	1 EA	LABEL, DRY LOC. EMPLACEMENT SECS
7	04.4020.0001	1 EA	1 EA	1 EA	MARKER, WIRE GND SYMBL VNYL CLOTH
8	04.9634.0136	2 EA	2 EA	2 EA	LABEL, VARI*LITE, YOKE LEG COVER
9	04.9634.0181	-	2 EA	-	LABEL, VL5B (*VL5B* luminaire only) (Not shown. On both sides of cross member.)
10	04.9647.0045	-	-	1 EA	LABEL, VL5A
11	04.9647.0070	-	-	1 EA	LABEL, VL5A ID TAG (PAT. & TRADE.) (Not shown. On heatsink latch.)
12	04.9647.0072	-	-	1 EA	LABEL, VL5A INPUT RATING
13	04.9647.0073	-	-	1 EA	LABEL, VL5A RELAMPING (Not shown. On heatsink latch.)
14	06.6018.0002	7 IN	7 IN	7 IN	VELCRO HOOK, 1" BLK ADHESIVE BAK.
15	10.9634.0134	2 EA	2 EA	2 EA	YOKE LEG COVER, EMI SHIELD MOD.
16	10.9647.0132	2 EA	-	2 EA	VL6 & VL5Arc YOKE COVER CLIP
17	12.9647.0138	-	-	1 EA	BLACKTAK LIGHT MASK FOIL TAPE
18	22.9634.0086	1 EA	1 EA	2 EA	ASSY, VL5 TOP LAMP COVER
19	22.9634.0087	1 EA	1 EA	-	ASSY, VL5 BOTTOM LAMP COVER
20	22.9634.0145	1 EA	1 EA	1 EA	ASSY, VL5 LAMP SAFETY CABLE
21	22.9634.0217	1 EA	1 EA	1 EA	ASSY, S300 HOOK/WING BOLT
22	42.5002.0005	1 EA	1 EA	-	GLASS, VL5 FRONT, STIPPLE
23	52.6264.0003	-	-	1 EA	CONN. HOUSING, 30 SERIES, W/ FLNGS
24	52.8330.0001	2 EA	-	2 EA	TAB, FASTON .250" .145 STUD DIA
25	53.2002.0001	2 EA	-	2 EA	NUT, 6-32 KEP ZINC PLATED
26	53.2025.0002	4 EA	4 EA	4 EA	NUT, 5/16-18 ZINC W/NYLON INSERT
27	53.6607.0001	2 EA	-	2 EA	SCREW, 6-32 X 1/4" PPB
28	53.6668.0001	4 EA	4 EA	4 EA	FASTENER,SPRG. STL,BLK,TINNERMAN U-TYPE
29	53.7001.0003	4 EA	4 EA	4 EA	SCREW,5/16-18X1 HEX CS ZINC GRD 5
30	55.2186.0001	-	-	3 EA	CABLE TIE, SMALL .10 X 4"
31	55.6538.0001	2 EA	-	2 EA	WASHER, LOCK, #6 INTERNAL TOOTH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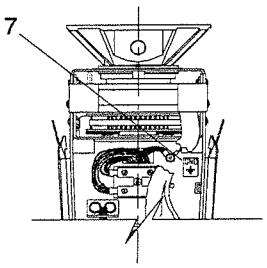
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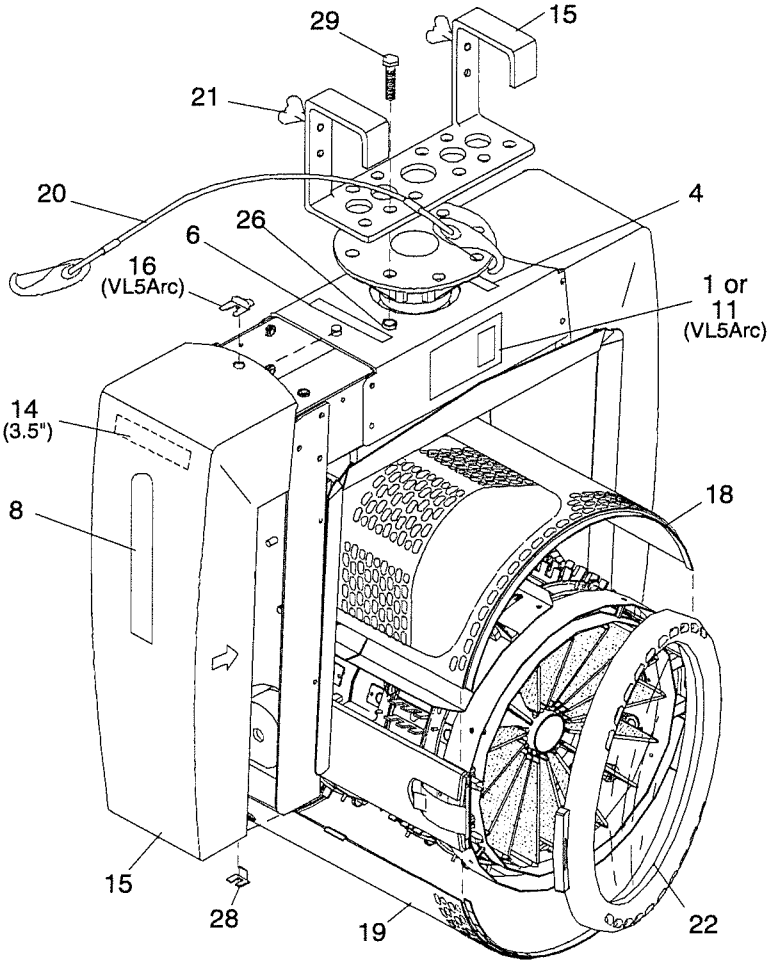
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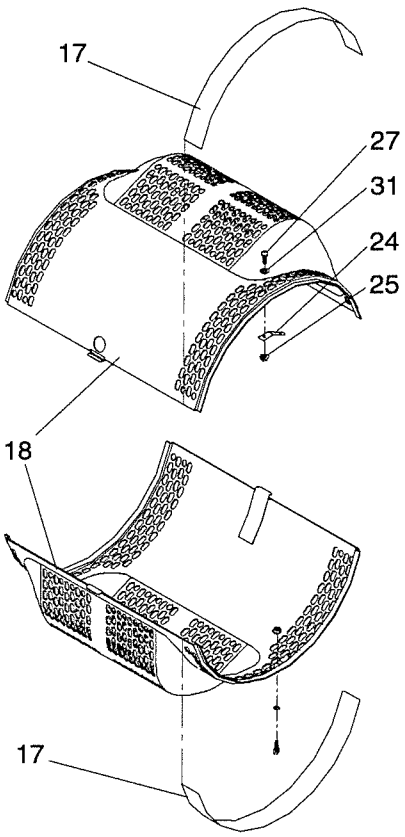
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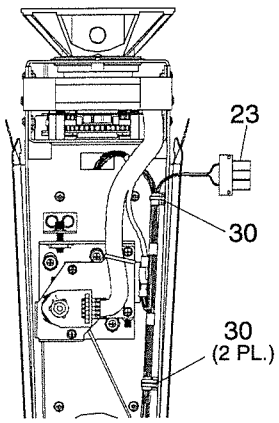
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4.2.2 Assy, *VL5* Head (*VL5/VL5B* Only) 22.9634.0002 (*VL5*) 22.9634.0202 (*VL5B*)

NO.	PART NO.	QTY	DESCRIPTION
1	10.9634.0077	6 IN	PAD, EXTRUDED, SILICONE, BULKHEAD
2	22.9634.0004	1 EA	ASSY, VL5 HINGED RAIL
3	22.9634.0005	1 EA	ASSY, VL5 LATCHED RAIL
4	22.9634.0121	1 EA	ASSY, VL5 BLU/AMB MOTOR
5	22.9634.0122	1 EA	ASSY, MAG/DIF MOTOR
6	53.5506.0312	8 EA	SCREW, 6-32X5/16"PPSS
7	55.2203.0001	12 EA	SCREW, 4-40X1/4"PPZ
8	55.6537.0001	8 EA	WASHER, LOCK #4 INTERNAL TOOTH
9	55.6538.0001	8 EA	WASHER, LOCK, #6 INTERNAL TOOTH
10	55.6706.0001	1 EA	GROMMET, 9/32IDX9/16ODX1/4T, SILICONE, RED
11	55.9634.0131	1 EA	SPRING, VL5 7" MOTOR WIRE

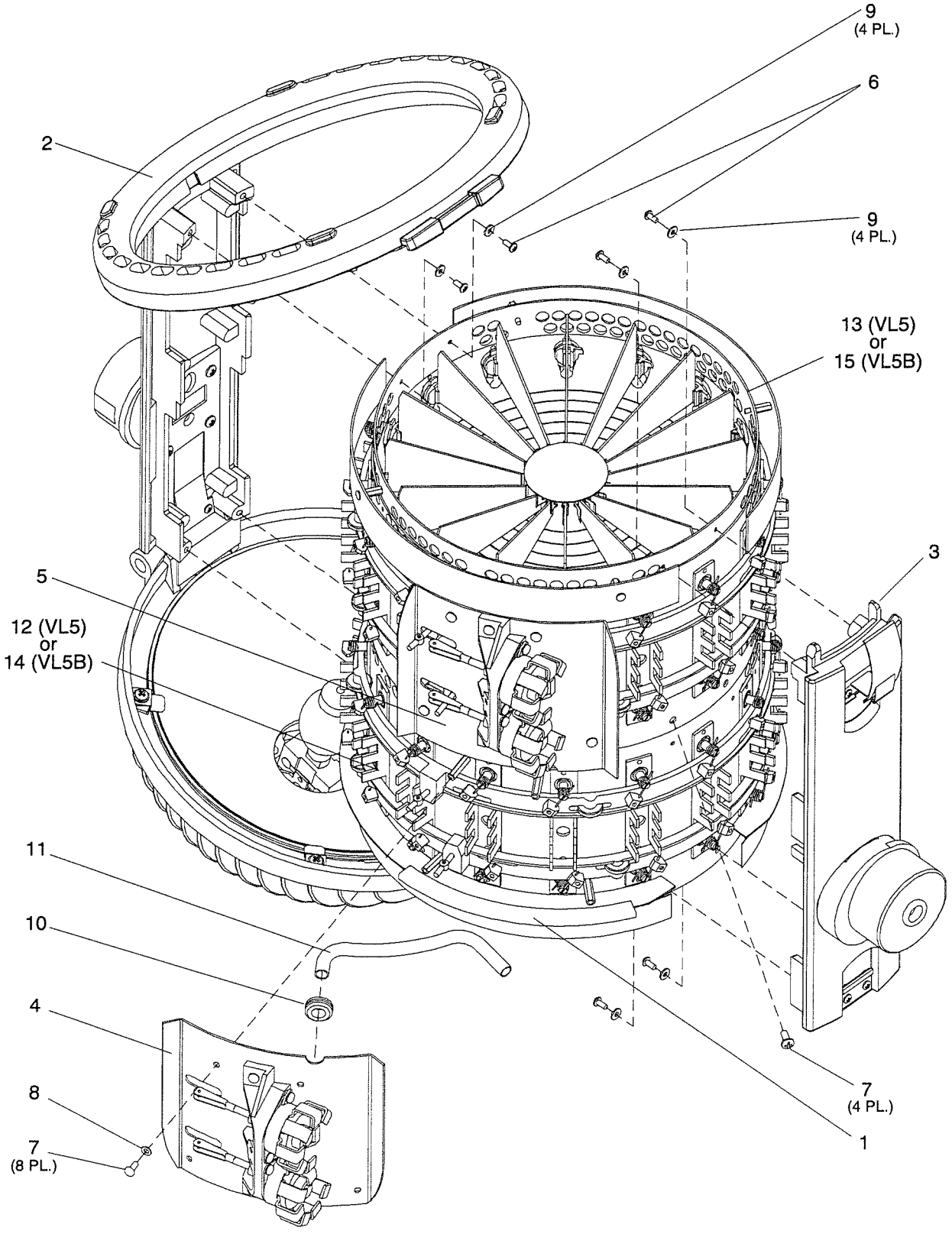
Parts for **VL5** luminaire only.

12	22.9634.0006	1 EA	ASSY, VL5 BLU/AMB BULKHEAD (***VL5*** **ONLY**)
13	22.9634.0007	1 EA	ASSY, VL5 MAG/DIF BULKHEAD (***VL5*** **ONLY**)

Parts for **VL5B** luminaire only.

14	22.9634.0203	1 EA	ASSY, VL5B MAG/AMB BULKHEAD (***VL5B*** **ONLY**)
15	22.9634.0204	1 EA	ASSY, VL5B BLU/DIF BULKHEAD (***VL5B*** **ONLY**)

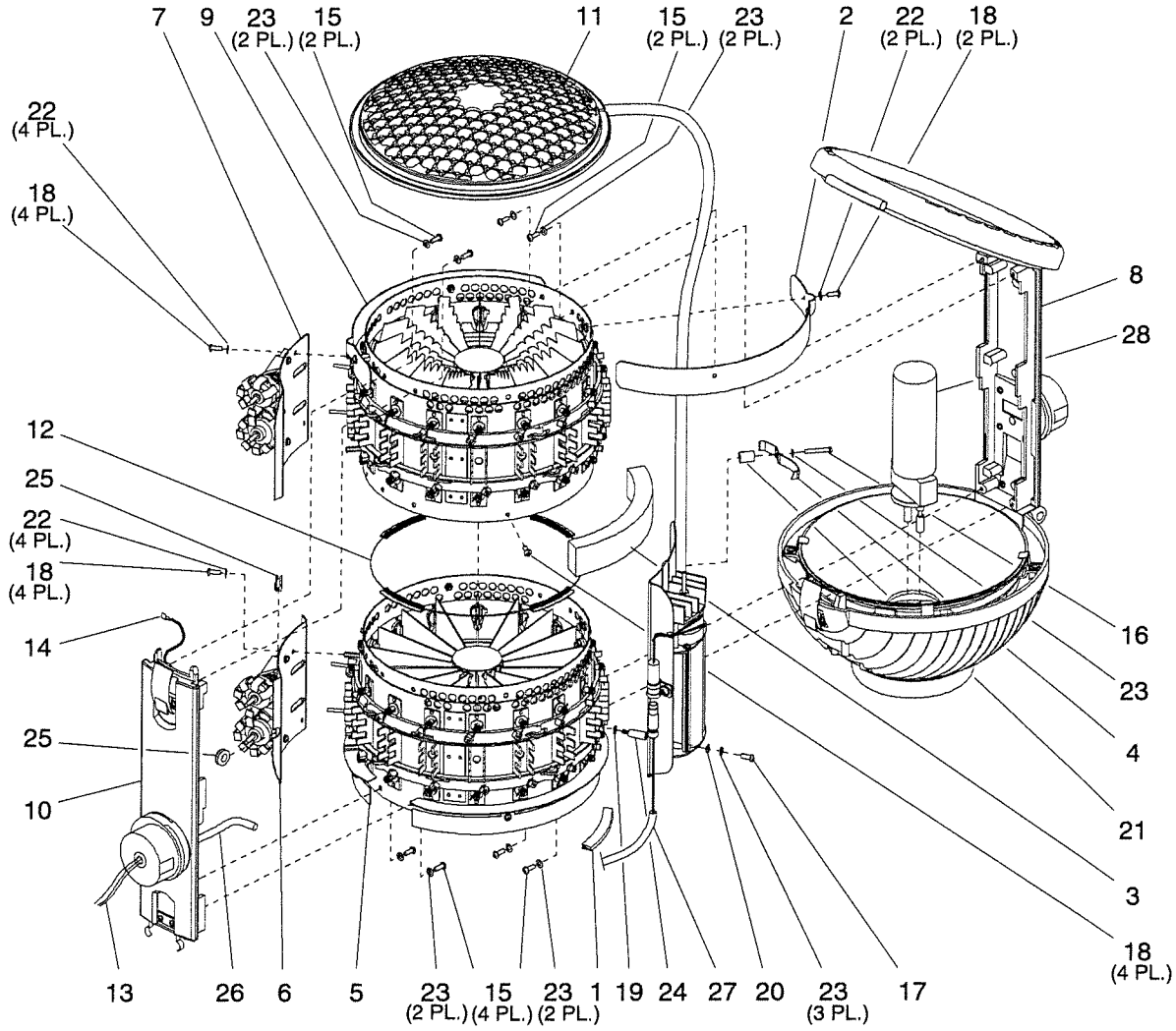
Assy, *VL5* Head (*VL5/VL5B* Only) (continued)



4.2.3 Assy, *VL5Arc* Head (*VL5Arc* Only) 21.9647.0002

NO.	PART NO.	QTY	DESCRIPTION
1	10.9634.0077	12 IN	PAD, EXTRUDED SILICONE, BULKHEAD
2	10.9647.0044	1 EA	BAFFLE, FRONT LIGHT, VL5Arc
3	10.9647.0092	1 EA	BAFFLE, HEAT/LIGHT
4	10.9647.0097	1 EA	BRASS TUBE RETAINER
5	22.9634.0006	1 EA	ASSY, VL5 BLU/AMB BULKHEAD
6	22.9634.0121	1 EA	ASSY, VL5 BLU/AMB MOTOR
7	22.9634.0122	1 EA	ASSY, MAG/DIF MOTOR
8	22.9647.0005	1 EA	ASSY, VL5Arc HINGED RAIL
9	22.9647.0007	1 EA	ASSY, VL5Arc MAGENTA/DIMMER BULKHEAD
10	22.9647.0014	1 EA	ASSY, LATCHED RAIL - VL5Arc
11	22.9647.0131	1 EA	ASSY, VL5A LENS/BELLOWS/MOTOR ASSY
12	22.9647.0137	1 EA	VL5Arc UV GLASS MOUNTING ASSEMBLY
13	25.9647.0108	1 EA	CBL ASSY, BELLOWS MOTOR EXT.
14	52.8244.0005	1 EA	FASTON RECEPT, INS. .250 22-18AWG
15	53.5506.0312	8 EA	SCREW, 6-32X5/16"PPSS
16	53.5506.0875	1 EA	SCREW, 6-32X7/8"
17	53.6524.0002	3 EA	SCREW, 6-32 X 5/16" PPSS
18	55.2203.0001	14 EA	SCREW, 4-40X1/4"PPZ
19	55.3301.0004	2 EA	WASHER, FLAT #4 SS
20	55.3301.0006	3 EA	WASHER, #6 FLAT SS
21	55.6506.0003	1 EA	SPACER, 3/8"RND X.141IDX.500 LG UNTHREADED TEFLON
22	55.6537.0001	10 EA	WASHER, #4 INT. TOOTH LOCK
23	55.6538.0001	12 EA	WASHER, LOCK, #6 INTERNAL TOOTH
24	55.6697.0012	2 EA	STANDOFF, 3/16"RND 4-40 M, 6-32F
25	55.6706.0001	2 EA	GROMMET, 9/32IDX9/16ODX1/4T, SILICONE, RED
26	55.9634.0131	1 EA	SPRING, VL5 7" MOTOR WIRE
27	55.9647.0075	1 EA	SPRING, BELLOWS MOTOR
28	71.2528.0575	1 EA	LAMP, 575 WATT ARC, PHILLIPS MSR575 HR

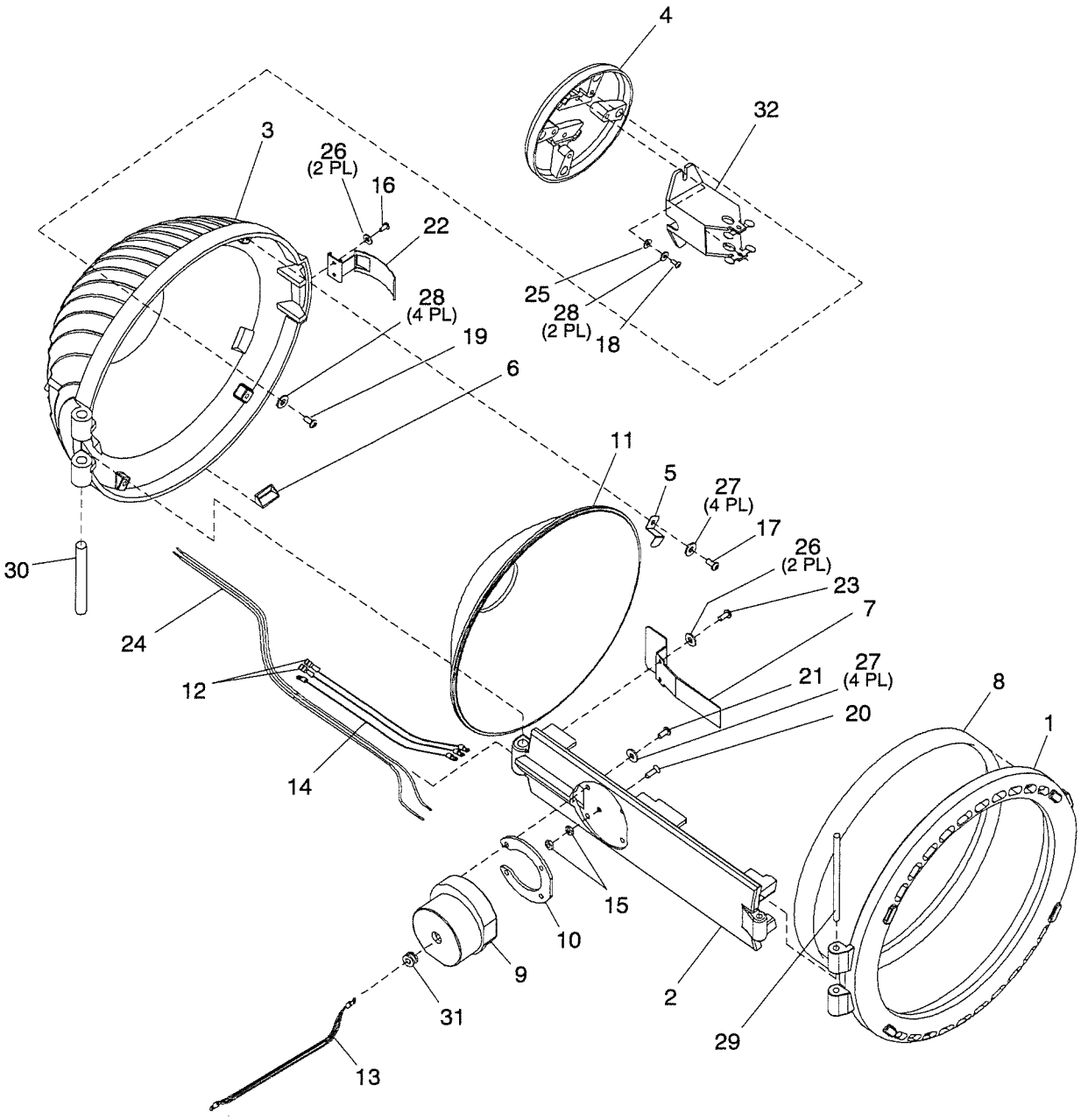
Assy, *VL5Arc* Head (Continued)



4.2.4 Assy, *VL5* Hinged Rail (*VL5/VL5B* Only) 22.9634.0004

NO.	PART NO.	QTY	DESCRIPTION
1	10.9634.0088	1 EA	FRONT RING, VL5
2	10.9634.0090	1 EA	SIDE RAIL, VL5 HINGED
3	10.9634.0091	1 EA	HEATSINK, VL5
4	10.9634.0092	1 EA	CAP, HEATSINK
5	10.9634.0100	4 EA	CLIP, MOUNTING REFLECTOR
6	10.9634.0103	3 EA	PAD, MOUNTING, REFLECTOR
7	10.9634.0135	1 EA	PLATE, LAMP WIRE, VL5
8	10.9634.0162	26 IN	PAD, VL5 FRONT RING
9	10.9634.0226	1 EA	MACHINED TILT TUBE, VL5
10	10.9647.0084	1 EA	INSULATOR, HEAT, VL5A
11	12.9634.0217	1 EA	REFLECTR, PAR 64, CUSTOM COATED BLK RIM
12	25.8007.2644	2 EA	GROUND STRAP ASSEMBLY
	52.8271.0009	1 EA	RECEPT, FASTON .250" 18-14 AWG NON INS
	52.8329.0001	1 EA	TERM, RING # 6 22-16 AWG NON-INS
	73.7130.0002	11 IN	WIRE, 7/64" TUBULAR BRAID SILVER-PLATED
13	25.9634.0140	1 EA	CABLE ASSY, VL5 GROUND SAFETY
14	25.8007.3344	1 EA	CABLE ASSY, #8 RING/#8 RING, 11”
	52.8329.0003	2 EA	TERM, RING # 8 22-16 AWG NON-INS
	73.7130.0002	11 IN	WIRE, 7/64" TUBULAR BRAID SILVER-PLATED
15	53.2002.0001	2 EA	NUT, 6-32 KEP ZINC PLATED
16	53.5504.0187	2 EA	SCREW, 4-40x3/16”PPSS
17	53.6607.0001	4 EA	SCREW, 6-32X1/4"PPB
18	53.5508.0375	2 EA	SCREW, 8-32X3/8"PPSS
19	53.5508.0625	4 EA	SCREW, 8-32 X 5/8"PPSS
20	53.5536.0625	1 EA	SCREW, 6-32 X 5/8"PFSS
21	53.6610.0003	4 EA	SCREW, 6-32 X 7/16” PPZ
22	54.1226.0001	1 EA	LATCH ASSY, VL5
23	55.2203.0001	2 EA	SCREW, 4-40X1/4"PPZ
24	55.2260.0208	12 IN	SLEEVING, FIBERGLASS, .208 I.D.
25	55.3301.0008	2 EA	WASHER, FLAT, #8SS
26	55.3303.0004	4 EA	WASHER, LOCK, INT.TOOTH #4SS
27	55.3303.0006	8 EA	WASHER, LOCK, INT.TOOTH #6SS
28	55.3303.0008	6 EA	WASHER, LOCK, INT.TOOTH #8SS
29	55.6612.0005	1 EA	PIN, 3/16OD X 2 3/4L, TYPE C, L/C STEEL
30	55.6612.0009	1 EA	PIN, SPRING,5/16OD X 2 3/4L ZINC PL
31	55.6525.0004	1 EA	BUSHING, 3/8”ID FLIP-LOK
32	71.9634.0132	1 EA	SOCKET, LAMP, VL5

Assy, *VL5* Hinged Rail (*VL5/VL5B* Only) (Continued)

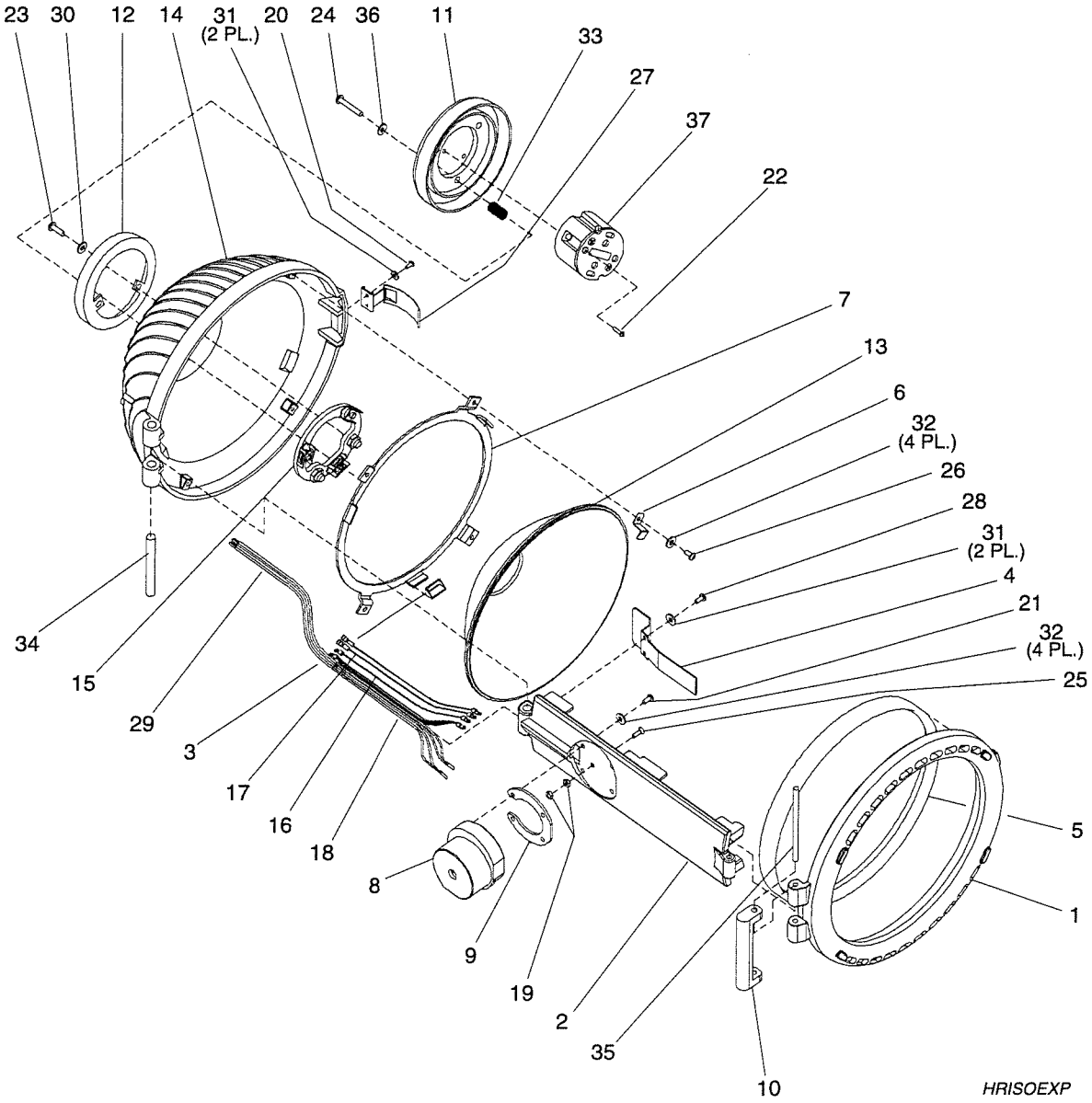


4.2.5 Assy, *VL5Arc* Hinged Rail (*VL5Arc* Only) 22.9647.0005

NO.	PART NO.	QTY	DESCRIPTION
1	10.9634.0088	1 EA	FRONT RING, VL5
2	10.9634.0090	1 EA	SIDE RAIL, VL5 HINGED
3	10.9634.0103	3 EA	PAD, MOUNTING, REFLECTOR
4	10.9634.0135	1 EA	PLATE, LAMP WIRE, VL5
5	10.9634.0162	26 IN	PAD, VL5 FRONT RING
6	10.9647.0039	4 EA	CLIP, VL5Arc REFLECTOR MOUNTING
7	10.9647.0068	1 EA	PLATE, REFLECTOR MOUNTING, VL5A
8	10.9647.0082	1 EA	TILT TUBE, ALUMINUM MACHINED - VL5Arc
9	10.9647.0084	1 EA	INSULATOR, HEAT, VL5Arc
10	10.9647.0107	1 EA	HINGE STOP
11	10.9647.0120	1 EA	BACKCAP, VL5A HEATSINK
12	10.9647.0126	1 EA	REAR LIGHT BAFFLE, VL5A
13	12.9634.0217	1 EA	REFLECTOR, PAR 64, CUSTOM COATED
14	12.9647.0061	1 EA	HEATSINK W/ POT BELLY BLACK, VL5A
15	22.9647.0032	1 EA	NUT RING, VL5Arc HEATSINK BACKCAP
16	25.8007.2244	1 EA	GND STRAP ASSY, #6 RING/#6 RING, 11"
	52.8329.0001	2 EA	TERM RING, #6 22-16AWG NON-INS
	73.7130.0001	11 IN	WIRE, 7/64" BRAIDED TUBULAR TINNED COPR
17	25.8007.2644	2 EA	GND STRAP ASSY,#6 RING/22-16WG FASTON,11"
	52.8329.0001	1 EA	TERM RING, #6 22-16AWG NON-INS
	52.8332.0001	1 EA	RECEPT, FASTON .250" 18-14AWG NON-INS
	73.7130.0001	11 IN	WIRE, 7/64" BRAIDED TUBULAR TINNED COPR
18	25.9647.0059	1 EA	CABLE ASSY, VL5Arc BULB WIRE
19	53.2002.0001	2 EA	NUT, 6-32 KEP ZINC PLATED
20	53.5504.0187	2 EA	SCREW, 4-40x3/16"PPSS
21	53.5506.0500	4 EA	SCREW, 6-32 X 1/2" PPSS
22	53.5508.0437	2 EA	SCREW, 8-32 X 7/16" PPSS
23	53.5510.0751	2 EA	SCREW, 10-32 X 3/4"PPSS BLK
24	53.5510.1751	3 EA	SCREW, 10-32 X 1-3/4"PPSS BLK
25	53.5536.0625	1 EA	SCREW, 6-32 X 5/8"PFSS
26	53.5606.0312	4 EA	SCREW, 6-32 X 5/16" PPSS BLK
27	54.1226.0001	1 EA	LATCH ASSY, VL5
28	55.2203.0001	2 EA	SCREW, 4-40X1/4"PPZ
29	55.2260.0208	23 IN	SLEEVING, FIBERGLASS 0.208 ID (2 X 11.5 IN)
30	55.3301.0010	2 EA	WASHER, FLAT #10
31	55.3303.0004	4 EA	WASHER, LOCK, INT.TOOTH #4SS
32	55.3303.0006	8 EA	WASHER, LOCK, INT.TOOTH #6SS
33	55.6568.0023	3 EA	SPRING, COMPRESSION 0.3 OD X 1.375" L

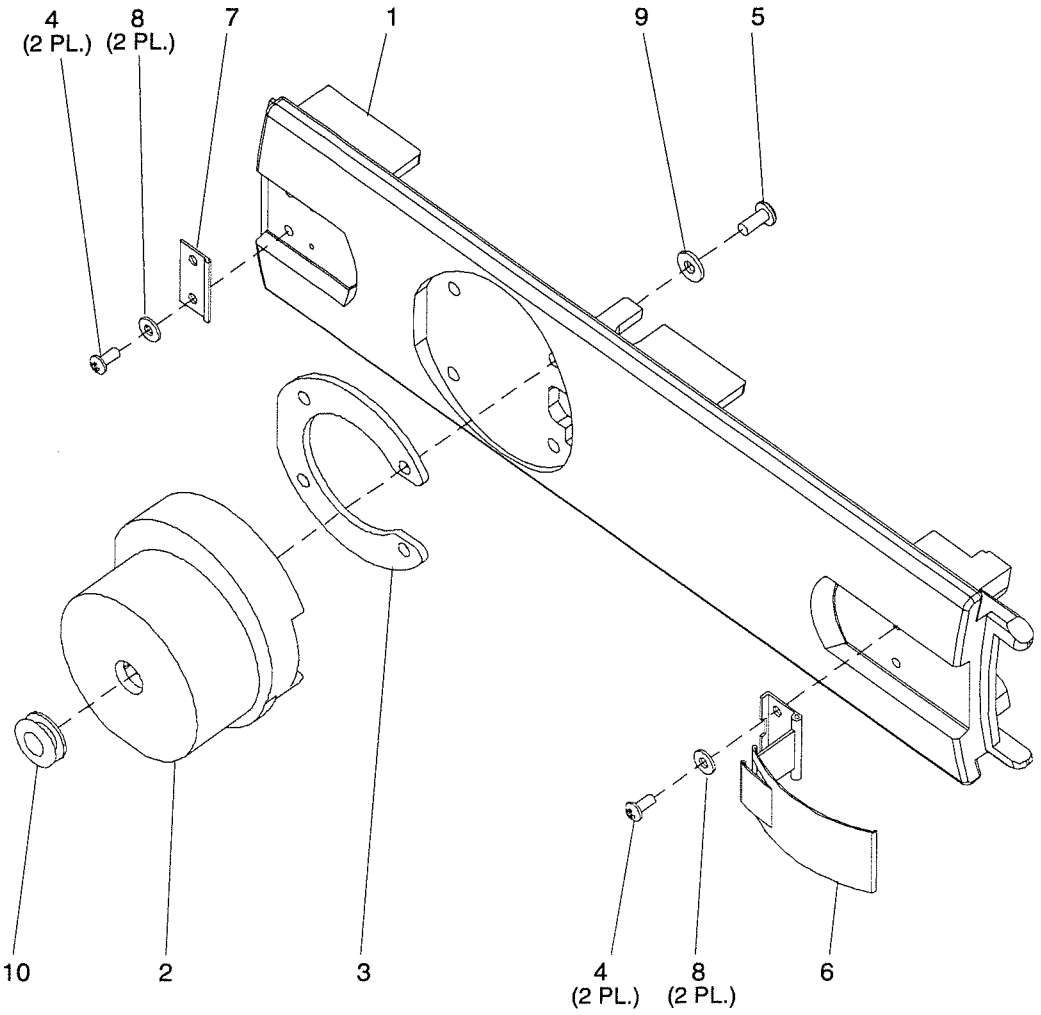
Assy, *VL5Arc* Hinged Rail (*VL5Arc* Only) (Continued)

NO.	PART NO.	QTY	DESCRIPTION
34	55.6612.0009	1 EA	PIN, SPRING, 5/16"DIA X 2-3/4"L ZINC PLT
35	55.6612.0014	1 EA	PIN, 3/16"OD X 3.35L, TYPE C
36	55.6635.0010	3 EA	WASHER, #10 SPHERICAL LEDLOY BLK OXD
37	71.2528.0003	1 EA	ASSY, VL5A LAMP SOCKET



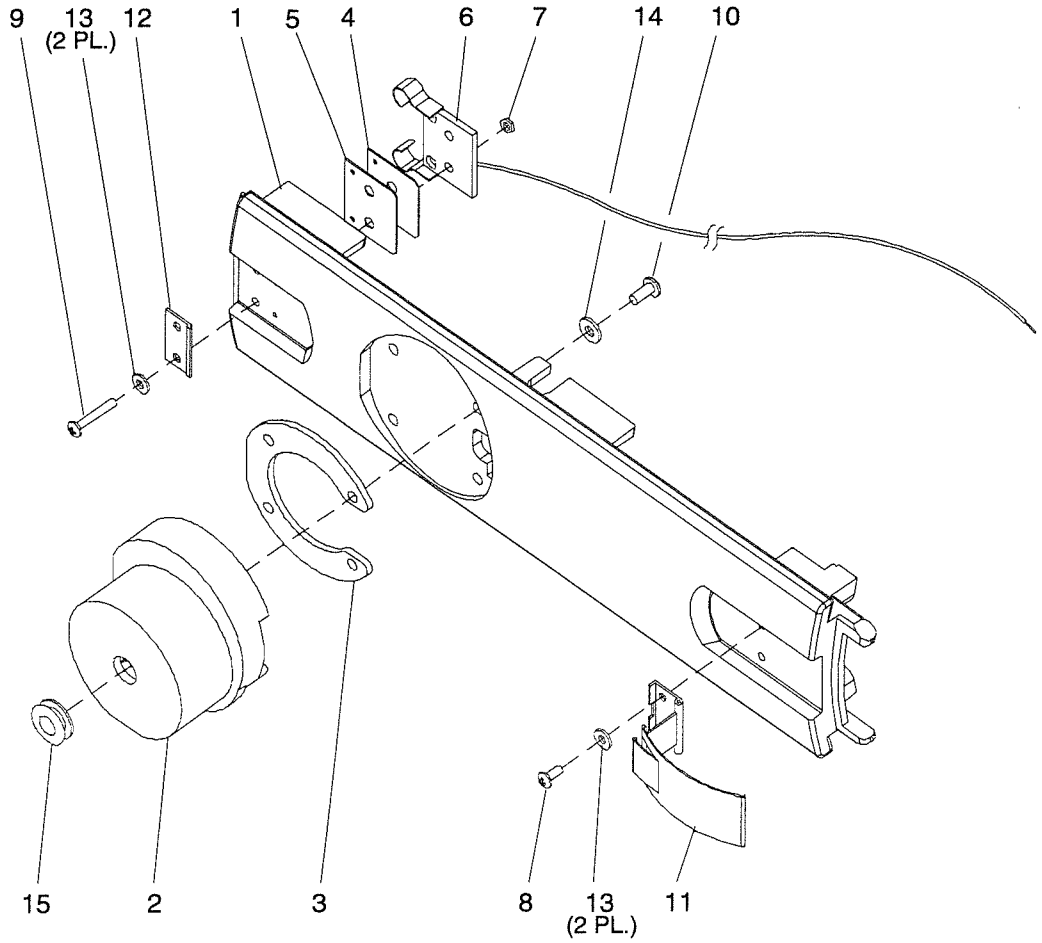
4.2.6 Assy, *VL5* Latched Rail (*VL5/VL5B* Only) 22.9634.0005

NO.	PART NO.	QTY	DESCRIPTION
1	10.9634.0089	1 EA	SIDE RAIL, VL5 LATCHED
2	10.9634.0226	1 EA	MACHINED TILT TUBE, VL5
3	10.9647.0084	1 EA	INSULATOR, HEAT, VL5A
4	53.5504.0187	4 EA	SCREW, 4-40X3/16"PPSS
5	53.6610.0003	4 EA	SCREW, 6-32 X 7/16" PPZ
6	54.1226.0001	1 EA	LATCH, ASSY, VL5
7	54.1226.0002	1 EA	STRIKE (VL5 LATCH CATCH)
8	55.3303.0004	4 EA	WASHER, LOCK, INT. TOOTH #4 SS
9	55.6538.0001	4 EA	WASHER, LOCK, #6 INTERNAL TOOTH
10	55.6706.0001	1 EA	GROMMET, 9/32IDX9/16ODX1/4T, SILICONE, RED



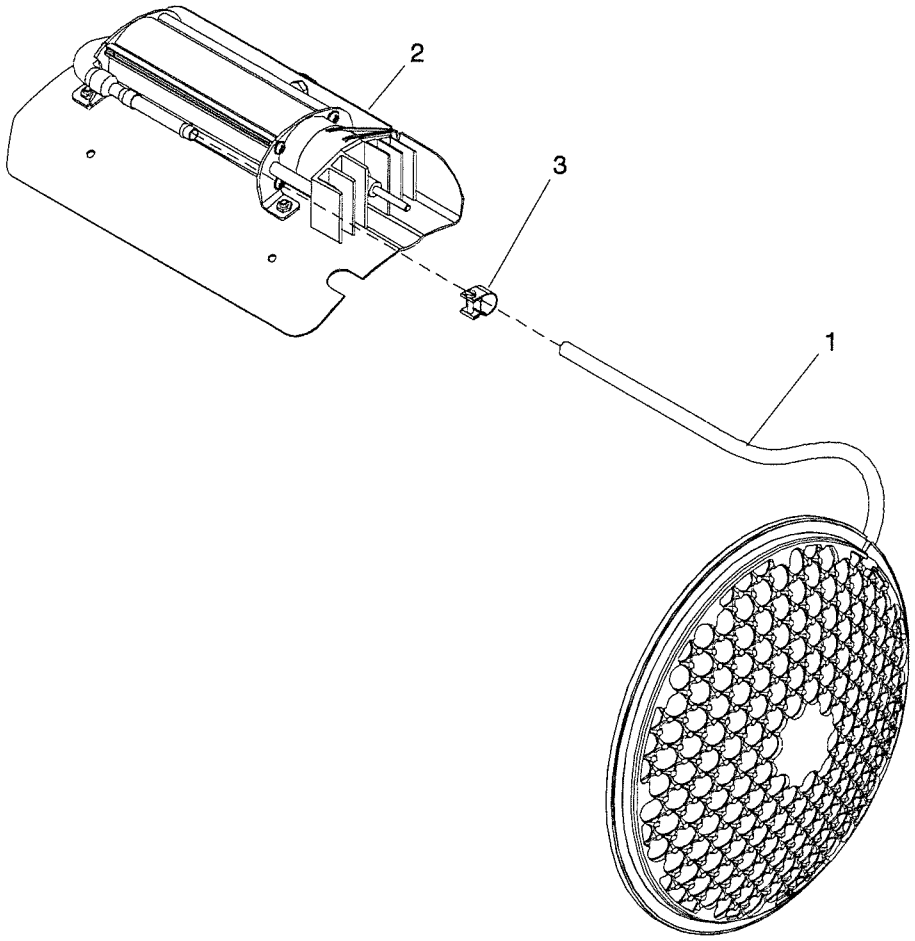
4.2.7 Assy, *VL5Arc* Latched Rail (*VL5Arc* Only) 22.9647.0014

NO.	PART NO.	QTY	DESCRIPTION
1	10.9634.0089	1 EA	SIDE RAIL, VL5 LATCHED
2	10.9647.0082	1 EA	TILT TUBE, ALUMINUM MACHINED - VL5Arc
3	10.9647.0084	1 EA	INSULATOR, HEAT, VL5Arc
4	10.9647.0117	1 EA	DISCONNECT INSULATING PAD
5	10.9647.0147	1 EA	SHEET, DISCONNECT INSULATION
6	23.9647.0129	1 EA	VL5A DISCONNECT PCB ASSEMBLY
7	53.2003.0001	2 EA	NUT, 4-40, KEP ZINC PLATED
8	53.5504.0187	2 EA	SCREW, 4-40X3/16"PPSS
9	53.6556.0001	2 EA	SCREW, 4-40 X 3/4" PPSS
10	53.5506.0500	4 EA	SCREW, 6-32 X 1/2" PPSS
11	54.1226.0001	1 EA	LATCH, ASSY, VL5
12	54.1226.0002	1 EA	STRIKE (VL5 LATCH CATCH)
13	55.3303.0004	4 EA	WASHER, LOCK, INT. TOOTH #4SS
14	55.6538.0001	4 EA	WASHER, LOCK, #6 INTERNAL TOOTH
15	55.6706.0001	1 EA	GROMMET, 9/32IDX9/16ODX1/4T, SILICONE, RED



4.2.8 Assy, *VL5Arc* Lens/Bellows (*VL5Arc* Only) 22.9647.0131

NO.	PART NO.	QTY	DESCRIPTION
-	06.6050.0100	7.5 CIN	OPTICAL FLUID, SHIN-ETSU FL 100 (not shown)
1	22.9647.0083	1 EA	ASSY, FRONT LENS, VL5Arc
2	22.9647.0132	1 EA	ASSY, BELLOWS, VL5Arc
3	55.6596.0006	1 EA	CLAMP, HOSE 5/16"-7/16" SS



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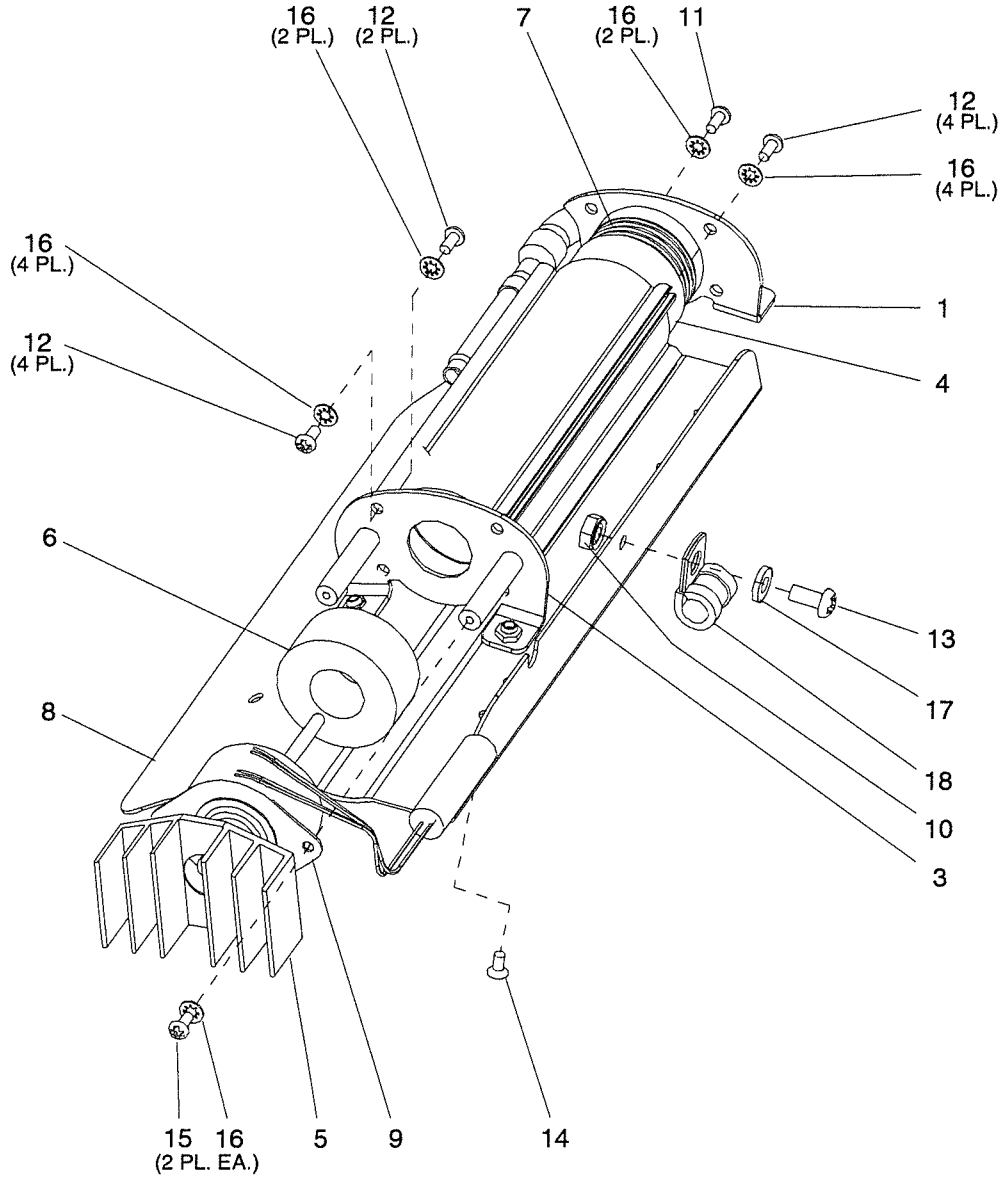
4.2.9 Assy, *VL5Arc* Bellows (*VL5Arc* Only) 22.9647.0132

NO.	PART NO.	QTY	DESCRIPTION
1	10.9647.0062	1 EA	BELLOWS BRACKET - VL5Arc
2	10.9647.0064	1 EA	BELLOWS, ENCLOSER-EXTRUDED/ANODIZED
3	10.9647.0076	1 EA	BELLOWS MOTOR BRACKET - VL5Arc
4	10.9647.0080	1 EA	TEFLON EXTRUSION INSERT - VL5Arc
5	10.9647.0081	1 EA	MOTOR HEAT SINK - VL5Arc
6	10.9647.0093	1 EA	SHIELD, DEBRIS, MOTOR/BELLOWS
7	22.9647.0078	1 EA	ASSY, BELLOWS - VL5Arc
8	22.9647.0096	1 EA	ASSY, BELLOWS MTG PLATE, INSULATED
9	22.9647.0113	1 EA	ASSY, LINE ACTUATOR
10	53.2200.0008	1 EA	NUT, 8-32 KEPS SS
11	53.5504.0187	2 EA	SCREW, 4-40X3/16" PPSS
12	53.5504.0250	10 EA	SCREW, 4-40x1/4" PPSS
13	53.5508.0375	1 EA	SCREW, 8-32 X 3/8" PPSS
14	53.5534.0312	4 EA	SCREW, 4-40 X 5/16"PFSS
15	53.5604.0312	2 EA	SCREW, 4-40 X 5/16" PPSS
16	55.3303.0004	14 EA	WASHER, LOCK, INT. TOOTH #4SS
17	55.6503.0004	1 EA	WASHER, #8 FLAT ZINC
18	55.6596.0007	1 EA	CLAMP, CABLE 3/8" SS W/ SILICONE

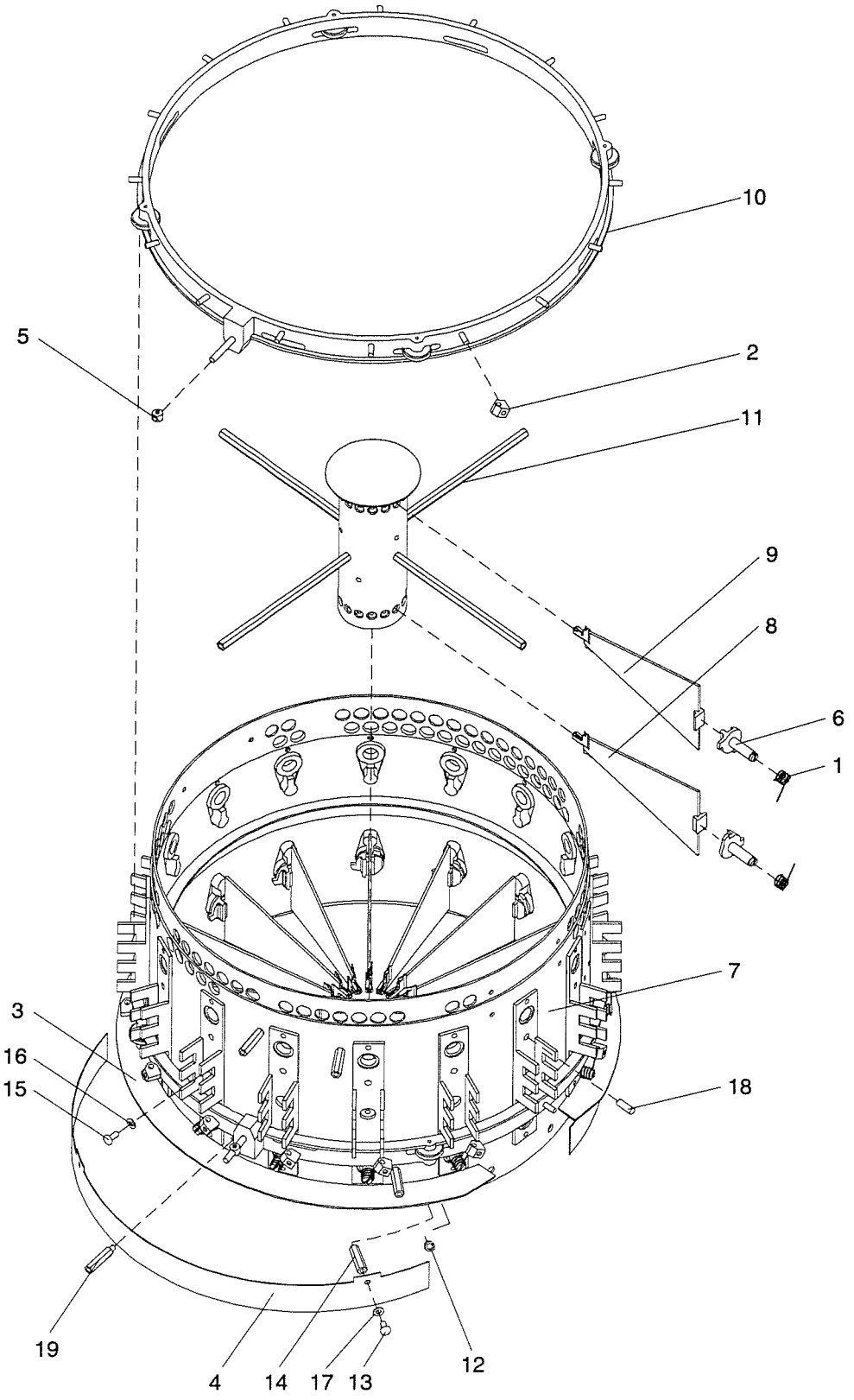
Assy, *VL5Arc* Bellows (*VL5Arc* Only) 22.9647.0132 (continued)



4.2.10 Assy, *VL5* Blu/Amb Bulkhead (*VL5/VL5Arc* Only) 22.9634.0006

NO.	PART NO.	QTY	DESCRIPTION
1	10.9634.0034	32 EA	SPRING, DRIVE ARM, FILTER
2	10.9634.0035	32 EA	LINK, DRIVE ARM
3	10.9634.0098	2 EA	DEFLECTOR, HEAT
4	10.9634.0101	2 EA	BAFFLE, REAR LIGHT
5	10.9634.0105	2 EA	LINK, SWIVEL
6	10.9634.0166	32 EA	CARRIER, FILTER, METAL INJ. MOLDED
7	22.9634.0024	1 EA	ASSY, VL5 BULKHEAD
	22.9634.0221	1 EA	BULKHEAD, VL5
	10.9634.0073	1 EA	RING, STIFFENING, BULKHEAD
	22.9634.0148	16 EA	ASSY, CARRIER BUSHING
8	22.9634.0123	16 EA	ASSY, VL5 SWP FILTER (BLUE)
9	22.9634.0124	16 EA	ASSY, VL5 LWP FILTER (AMBER)
10	22.9634.0143	2 EA	ASSY, VL5 DRIVE RING
11	22.9634.0119	1 EA	ASSY, VL5 CENTER HUB
12	53.2002.0001	4 EA	NUT, 6-32 KEP ZINC PLATED
13	53.6608.0003	4 EA	SCREW, 6-32X3/16"PPZ
14	55.2166.0250	4 EA	STANDOFF, 1/4"HEX 6-32X1/4"SSMF
15	55.2203.0001	4 EA	SCREW, 4-40X1/4"PPZ
16	55.6537.0001	4 EA	WASHER, LOCK #4 INTERNAL TOOTH
17	55.6538.0001	4 EA	WASHER, LOCK, #6 INTERNAL TOOTH
18	55.6612.0008	8 EA	PIN,1/8OD X 3/8L TYPE-C, S/S, DRIV-LOK
19	55.6669.0009	4 EA	STANDOFF, 1/4"HEX 4-40X5/8"SS

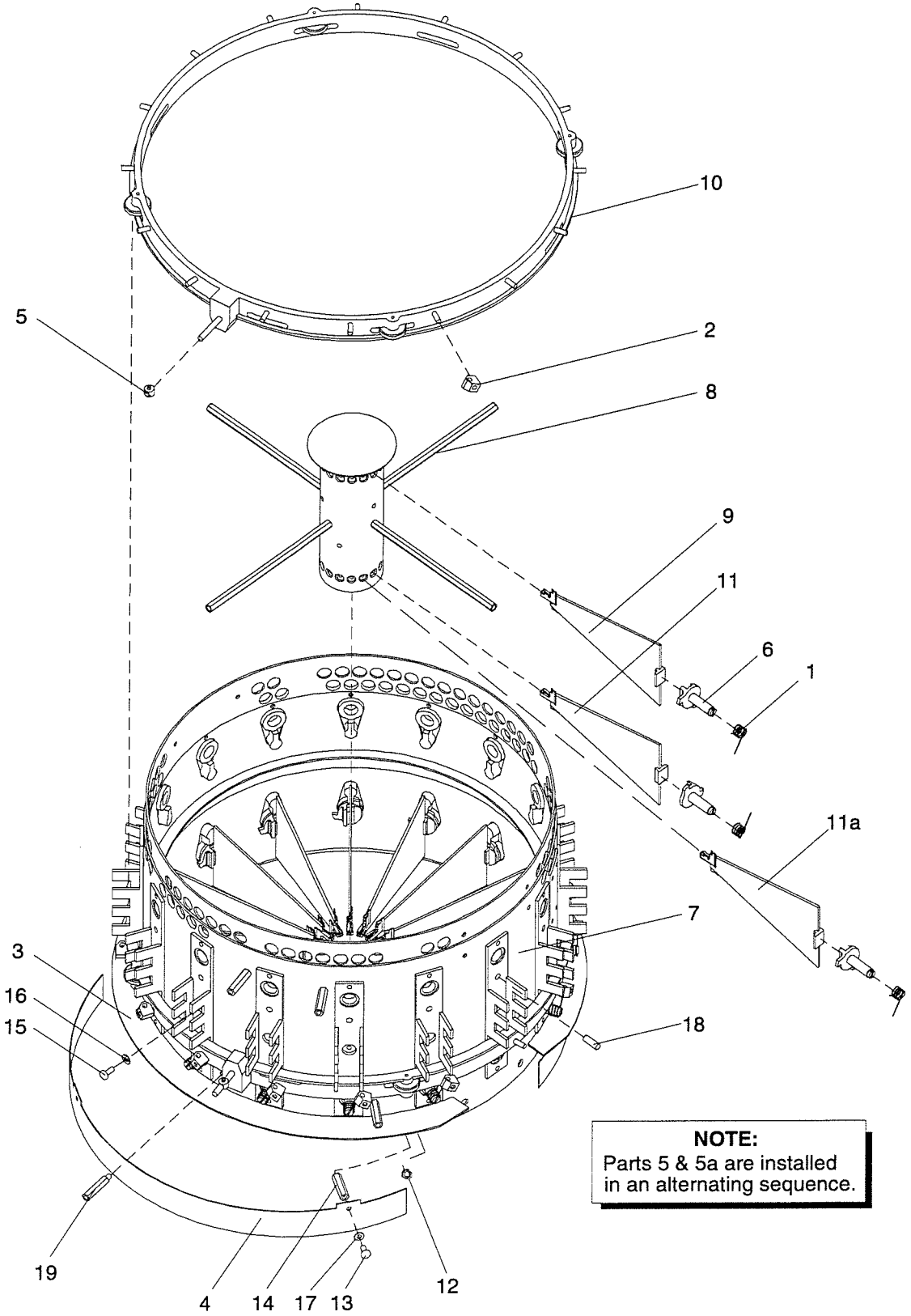
Assy, *VL5* Blu/Amb Bulkhead (*VL5/VL5Arc* Only) (Continued)



4.2.11 Assy, *VL5B* Mag/Amb Bulkhead (*VL5B* Only) 22.9634.0203

NO.	PART NO.	QTY	DESCRIPTION
1	10.9634.0034	32 EA	SPRING, DRIVE ARM, FILTER
2	10.9634.0035	32 EA	LINK, DRIVE ARM
3	10.9634.0098	2 EA	DEFLECTOR, HEAT
4	10.9634.0101	2 EA	BAFFLE, REAR LIGHT
5	10.9634.0105	2 EA	LINK, SWIVEL
6	10.9634.0166	32 EA	CARRIER, FILTER, METAL INJ. MOLDED
7	22.9634.0024	1 EA	ASSY, VL5 BULKHEAD
	22.9634.0221	1 EA	BULKHEAD, VL5
	10.9634.0073	1 EA	RING, STIFFENING, BULKHEAD
	22.9634.0148	16 EA	ASSY, CARRIER BUSHING
8	22.9634.0119	1 EA	ASSY, VL5 CENTER HUB
9	22.9634.0124	16 EA	ASSY, VL5 LWP FILTER (AMBER)
10	22.9634.0143	2 EA	ASSY, VL5 DRIVE RING
11	22.9634.0189	8 EA	ASSY, VL5B CCF DOWNSCALE FILTER, MAGENTA
11a	22.9634.0190	8 EA	ASSY, VL5B CCF UPSCALE FILTER, MAGENTA
12	53.2002.0001	4 EA	NUT, 6-32 KEP ZINC PLATED
13	53.6608.0003	4 EA	SCREW, 6-32X3/16"PPZ
14	55.2166.0250	4 EA	STANDOFF, 1/4"HEX 6-32X1/4"SSMF
15	55.2203.0001	4 EA	SCREW, 4-40X1/4"PPZ
16	55.6537.0001	4 EA	WASHER, LOCK #4 INTERNAL TOOTH
17	55.6538.0001	4 EA	WASHER, LOCK, #6 INTERNAL TOOTH
18	55.6612.0008	8 EA	PIN,1/8OD X 3/8L TYPE-C, S/S, DRIV-LOK
19	55.6669.0009	4 EA	STANDOFF, 1/4"HEX 4-40X5/8"SS

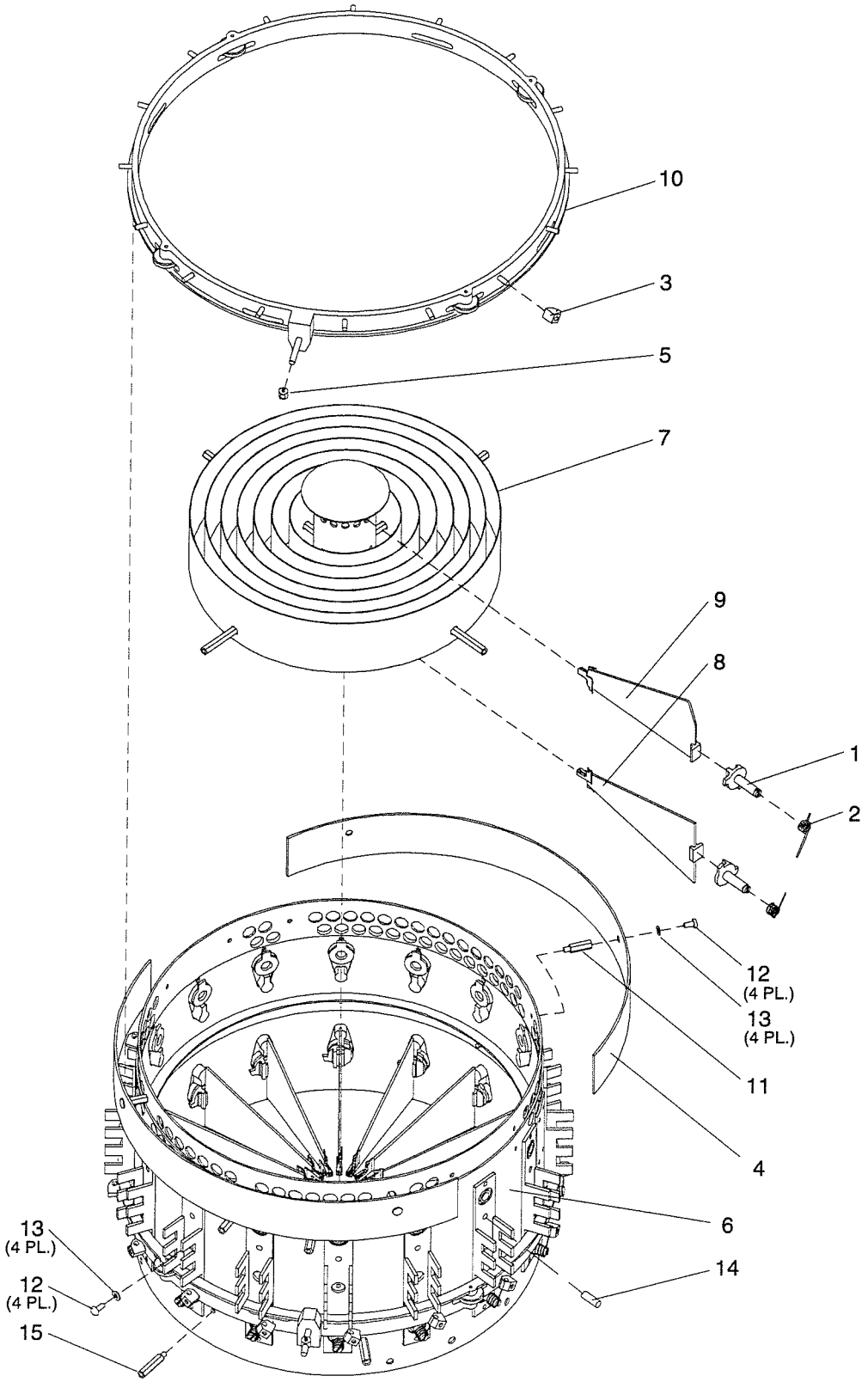
Assy, *VL5B* Mag/Amb Bulkhead (*VL5B* Only) (Continued)



4.2.12 Assy, *VL5* Mag/Dif Bulkhead (*VL5* Only) 22.9634.0007

NO.	PART NO.	QTY	DESCRIPTION
1	10.9634.0026	32 EA	CARRIER, FILTER
2	10.9634.0034	32 EA	SPRING, DRIVE ARM, FILTER
3	10.9634.0035	32 EA	LINK, DRIVE ARM
4	10.9634.0102	2 EA*	BAFFLE, FRONT LIGHT
5	10.9634.0105	2 EA	LINK, SWIVEL
6	22.9634.0024	1 EA	ASSY, VL5 BULKHEAD
	22.9634.0221	1 EA	BULKHEAD, VL5
	10.9634.0073	1 EA	RING, STIFFENING, BULKHEAD
	22.9634.0148	16 EA	ASSY, CARRIER BUSHING
7	22.9634.0120	1 EA	ASSY, VL5 LIGHT BAFFLE
8	22.9647.0074	16 EA	ASSY, VL5 CCF FILTER (MAGENTA)
9	22.9634.0126	16 EA	ASSY, VL5 DIFFUSER PANEL
10	22.9634.0143	2 EA	ASSY, VL5 DRIVE RING
11	55.2164.0437	4 EA	STANDOFF, 1/4"HEX 4-40X7/16"SSMF
12	55.2203.0001	8 EA	SCREW, 4-40X1/4"PPZ
13	55.6537.0001	8 EA	WASHER, LOCK #4 INTERNAL TOOTH
14	55.6612.0008	8 EA	PIN, 1/8OD X 3/8L TYPE-C, S/S, DRIV-LOK
15	55.6669.0009	4 EA	STANDOFF, 1/4"HEX 4-40X5/8"SS

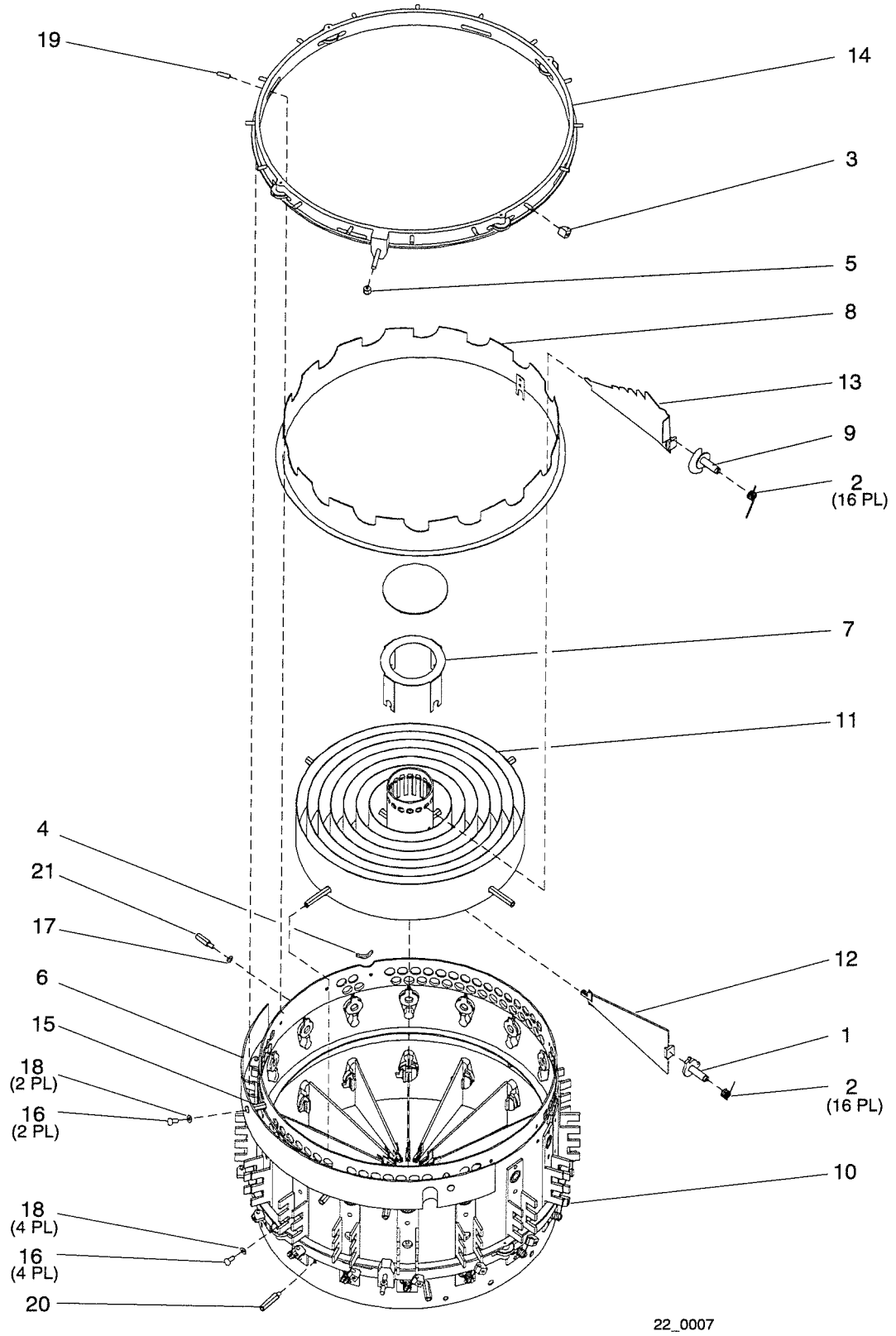
Assy, VL5 Mag/Dif Bulkhead (Continued)



4.2.13 Assy, *VL5Arc* Mag/Dif Bulkhead (*VL5Arc* Only) 22.9647.0007

NO.	PART NO.	QTY	DESCRIPTION
1	10.9634.0026	16 EA	CARRIER, FILTER
2	10.9634.0034	32 EA	SPRING, DRIVE ARM, FILTER
3	10.9634.0035	32 EA	LINK, DRIVE ARM
4	10.9634.0077	2 IN	PAD, EXTRUDED SILICONE, BULKHEAD
5	10.9634.0105	2 EA	LINK, SWIVEL
6	10.9647.0044	1 EA*	BAFFLE, VL5Arc FRONT LIGHT
7	10.9647.0121	1 EA	INNER LIGHT BAFFLE
8	10.9647.0122	1 EA	OUTER LIGHT BAFFLE
9	10.9647.0124	16 EA	DIMMER CARRIER
10	22.9634.0024	1 EA	ASSY, VL5 BULKHEAD
	22.9634.0221	1 EA	BULKHEAD, VL5
	10.9634.0073	1 EA	RING, STIFFENING, BULKHEAD
	22.9634.0148	16 EA	ASSY, CARRIER BUSHING
11	22.9634.0120	1 EA	ASSY, VL5 LIGHT BAFFLE
12	22.9647.0074	16 EA	ASSY, VL5 CCF FILTER (MAGENTA)
13	22.9647.0136	16 EA	ASSY, VL5 DIMMER BLADE, VL5A
14	22.9634.0143	2 EA	ASSY, VL5 DRIVE RING
15	55.2164.0437	4 EA	STANDOFF, 1/4"HEX 4-40X7/16"SSMF
16	55.2203.0001	6 EA	SCREW, 4-40X1/4"PPZ
17	55.3301.0004	2 EA	WASHER, FLAT #4 SS
18	55.6537.0001	6 EA	WASHER, LOCK #4 INTERNAL TOOTH
19	55.6612.0008	8 EA	PIN, 1/8OD X 3/8L TYPE-C, S/S, DRIV-LOK
20	55.6669.0009	4 EA	STANDOFF, 1/4"HEX 4-40X5/8"SS
21	55.6697.0012	2 EA	STANDOFF, 3/16" RDN 4-40 M 6-32 F

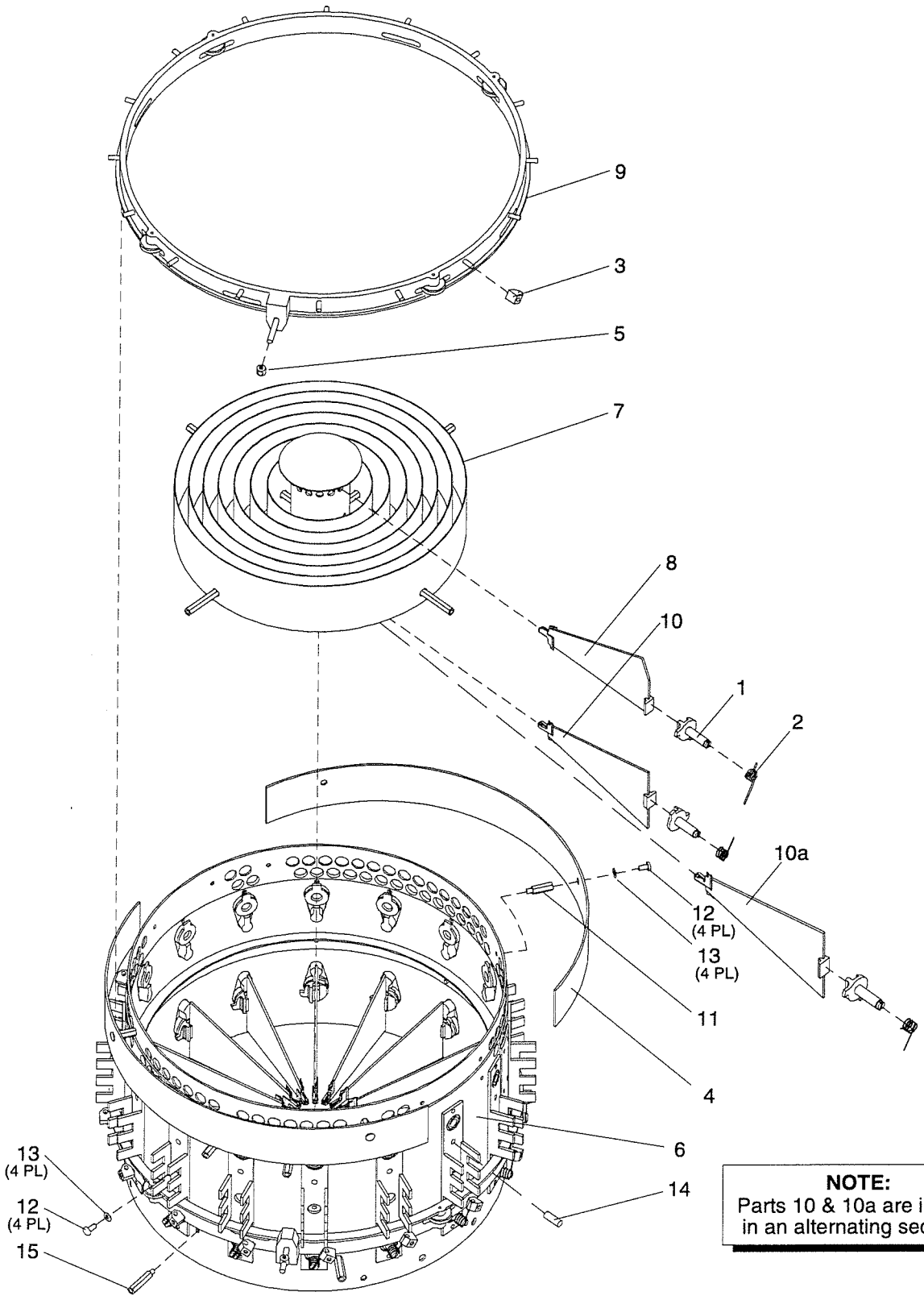
Assy, *VL5Arc* Mag/Dif Bulkhead (Continued)



4.2.14 Assy, *VL5B* Blu/Dif Bulkhead (*VL5B* Only) 22.9634.0204

NO.	PART NO.	QTY	DESCRIPTION
1	10.9634.0026	32 EA	CARRIER, FILTER
2	10.9634.0034	32 EA	SPRING, DRIVE ARM, FILTER
3	10.9634.0035	32 EA	LINK, DRIVE ARM
4	10.9634.0102	2 EA	BAFFLE, FRONT LIGHT
5	10.9634.0105	2 EA	LINK, SWIVEL
6	22.9634.0024	1 EA	ASSY, VL5 BULKHEAD
	22.9634.0221	1 EA	BULKHEAD, VL5
	10.9634.0073	1 EA	RING, STIFFENING, BULKHEAD
	22.9634.0148	16 EA	ASSY, CARRIER BUSHING
7	22.9634.0120	1 EA	ASSY, VL5 LIGHT BAFFLE
8	22.9634.0126	16 EA	ASSY, VL5 DIFFUSER PANEL
9	22.9634.0143	2 EA	ASSY, VL5 DRIVE RING
10	22.9634.0187	8 EA	ASSY, VL5B SWP DOWNSCALE FILTER, BLUE
10a	22.9634.0188	8 EA	ASSY, VL5B SWP UPSCALE FILTER, BLUE
11	55.2164.0437	4 EA	STANDOFF, 1/4"HEX 4-40X7/16"SSMF
12	55.2203.0001	8 EA	SCREW, 4-40X1/4"PPZ
13	55.6537.0001	8 EA	WASHER, LOCK #4 INTERNAL TOOTH
14	55.6612.0008	8 EA	PIN, 1/8OD X 3/8L TYPE-C, S/S, DRIV-LOK
15	55.6669.0009	4 EA	STANDOFF, 1/4"HEX 4-40X5/8"SS

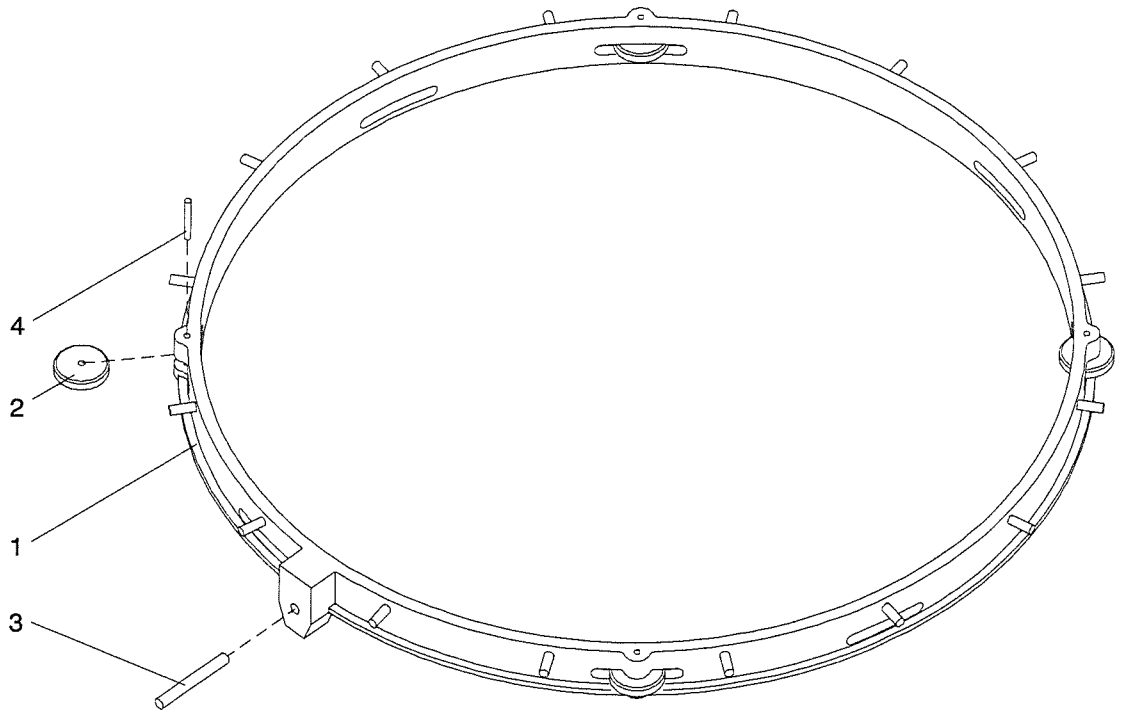
Assy, *VL5B* Blu/Dif Bulkhead (*VL5B* Only) (Continued)



NOTE:
Parts 10 & 10a are installed in an alternating sequence.

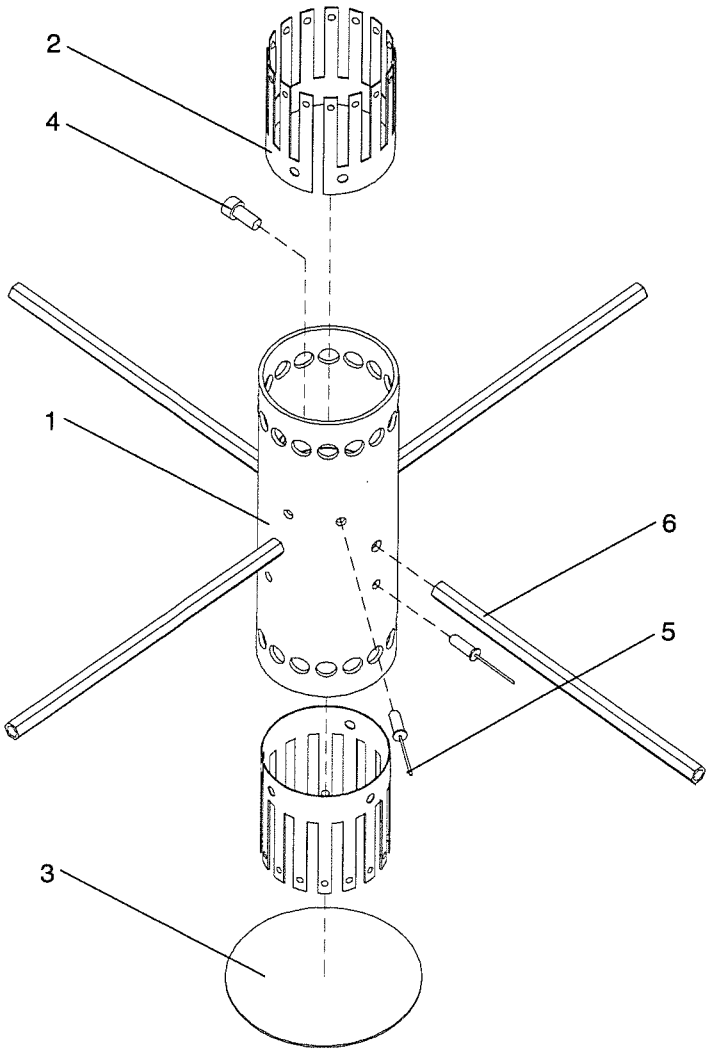
4.2.15 Assy, VL5 Drive Ring 22.9634.0143

NO.	PART NO.	QTY	DESCRIPTION
1	10.9634.0027	1 EA	RING, DRIVE
2	10.9634.0044	4 EA	ROLLER, VL5 DRIVE RING, SM
3	53.5554.0875	1 EA	SCREW, SET, 4-40X7/8"SS FLAT POINT
4	55.6612.0004	4 EA	PIN, 1/16OD X 1/2L, TYPE C, 303S/S



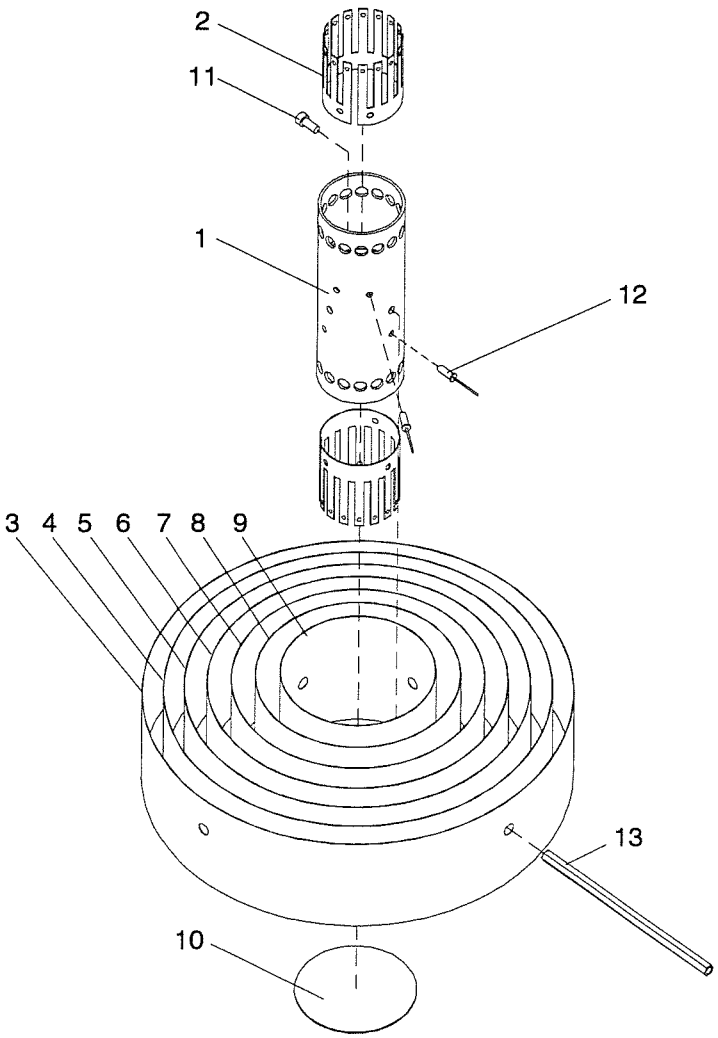
4.2.16 Assy, *VL5* Center Hub 22.9634.0119

NO.	PART NO.	QTY	DESCRIPTION
1	10.9634.0028	1 EA	HUB, CENTER, VL5 BULKHEAD
2	10.9634.0029	2 EA	SPRING, FINGER, FILTER SUPPORT
3	10.9634.0133	1 EA	PLUG, HUB
4	53.5704.0250	4 EA	SCREW, 4-40X1/4"SCSS
5	53.6534.0003	8 EA	RIVET, POP, STEEL 3/32OD X 3/32GRIP
6	55.6669.0008	4 EA	STANDOFF, 5/32"HEX 4-40X3-5/16"SS BLACK



4.2.17 Assy, *VL5* Light Baffle 22.9634.0120

NO.	PART NO.	QTY	DESCRIPTION
1	10.9634.0028	1 EA	HUB, CENTER, VL5 BULKHEAD
2	10.9634.0029	2 EA	SPRING, FINGER, FILTER SUPPORT
3	10.9634.0078	1 EA	RING, LIGHT BAFFLE, #1
4	10.9634.0079	1 EA	RING, LIGHT BAFFLE, #2
5	10.9634.0080	1 EA	RING, LIGHT BAFFLE, #3
6	10.9634.0081	1 EA	RING, LIGHT BAFFLE, #4
7	10.9634.0082	1 EA	RING, LIGHT BAFFLE, #5
8	10.9634.0083	1 EA	RING, LIGHT BAFFLE, #6
9	10.9634.0084	1 EA	RING, LIGHT BAFFLE, #7
10	10.9634.0133	1 EA	PLUG, HUB
11	53.5704.0250	4 EA	SCREW, 4-40X1/4"SCSS
12	53.6534.0003	8 EA	RIVET, POP, STEEL 3/32OD X 3/32GRIP
13	55.6669.0008	4 EA	STANDOFF, 5/32"HEX 4-40X3-5/16"SS BLACK



4.2.18 *VL5* Filter/Diffuser Panel Assemblies

4.2.18.1 Assy, *VL5* LWP Filter (Amber) 22.9634.0124

NO.	PART NO.	QTY	DESCRIPTION
1	10.9634.0067	1 EA	PAD, FILTER, EXTRUSION, SILICONE, WHITE
3	10.9634.0156	1 EA	CARRIER, CENTER FILTER, VL5 BLU/AMB/DIFF
2	41.9634.0041	1 EA	FILTER, LWP, AMBER

4.2.18.2 Assy, Diffuser Panel 22.9634.0126

NO.	PART NO.	QTY	DESCRIPTION
1	10.9634.0067	1 EA	PAD, FILTER, EXTRUSION, SILICONE, WHITE
3	10.9634.0156	1 EA	CARRIER, CENTER FILTER, VL5 BLU/AMB/DIFF
2	42.9634.0063	1 EA	PANEL, DIFFUSER

4.2.18.3 Assy, *VL5* SWP Filter (Blue) (*VL5/VL5Arc* Only) 22.9634.0123

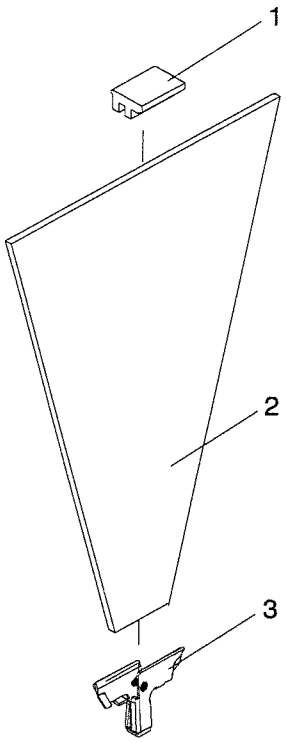
NO.	PART NO.	QTY	DESCRIPTION
1	10.9634.0067	1 EA	PAD, FILTER, EXTRUSION, SILICONE, WHITE
3	10.9634.0156	1 EA	CARRIER, CENTER FILTER, VL5 BLU/AMB/DIFF
2	41.9634.0040	1 EA	FILTER, SWP, BLUE

4.2.18.4 Assy, *VL5* CCF Filter (Magenta) (*VL5/VL5B* Only) 22.9647.0074

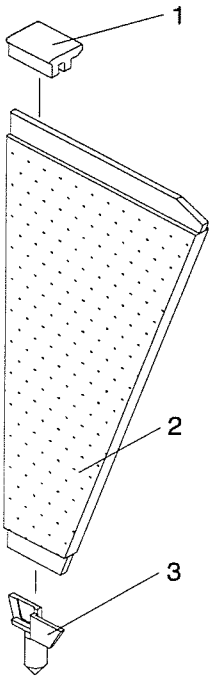
NO.	PART NO.	QTY	DESCRIPTION
1	10.9634.0067	1 EA	PAD, FILTER, EXTRUSION, SILICONE, WHITE
3	10.9634.0157	1 EA	CARRIER, CENTER FILTER, VL5 MAGENTA
2	41.9634.0042	1 EA	FILTER, COMPLEX COLOR, MAGENTA

VL5 Filter/Diffuser Panel Assemblies (Continued)

ASSY, *VL5* SWP/LWP/CCF FILTER



ASSY, DIFFUSER PANEL



4.2.19 *VL5B* Pastel Filter Panel Assemblies

4.2.19.1 Assy, *VL5B* SWP Downscale Filter, Blue (*VL5B* Only) 22.9634.0187

NO.	PART NO.	QTY	DESCRIPTION
1	10.9634.0182	1 EA	PAD, FILTER, EXTRUSION, SILICONE, GREY
2	41.9634.0183	1 EA	FILTER, VL5B SWP-DOWNSCALE
3	10.9634.0157	1 EA	CARRIER, CENTER FILTER, VL5 MAGENTA

4.2.19.2 Assy, *VL5B* SWP Upscale Filter, Blue (*VL5B* Only) 22.9634.0188

NO.	PART NO.	QTY	DESCRIPTION
1	10.9634.0067	1 EA	PAD, FILTER, EXTRUSION, SILICONE, WHITE
2	41.9634.0184	1 EA	FILTER, VL5B SWP-UPSCALE
3	10.9634.0157	1 EA	CARRIER, CENTER FILTER, VL5 MAGENTA

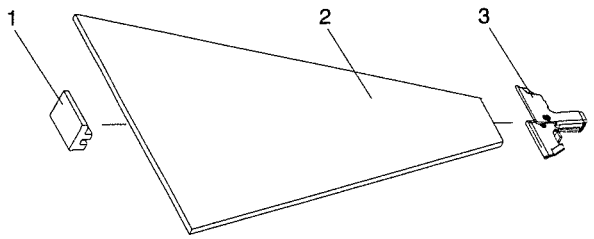
4.2.19.3 Assy, *VL5B* CCF Downscale Filter, Magenta (*VL5B* Only) 22.9634.0189

NO.	PART NO.	QTY	DESCRIPTION
1	10.9634.0182	1 EA	PAD, FILTER, EXTRUSION, SILICONE, GREY
2	41.9634.0185	1 EA	FILTER, VL5B CCF-DOWNSCALE
3	10.9634.0156	1 EA	CARRIER, CENTER FILTER, VL5 BLU/AMB/DIFF

4.2.19.4 Assy, *VL5B* CCF Upscale Filter, Magenta (*VL5B* Only) 22.9634.0190

NO.	PART NO.	QTY	DESCRIPTION
1	10.9634.0067	1 EA	PAD, FILTER, EXTRUSION, SILICONE, WHITE
2	41.9634.0186	1 EA	FILTER, VL5B CCF-UPSCALE
3	10.9634.0156	1 EA	CARRIER, CENTER FILTER, VL5 BLU/AMB/DIFF

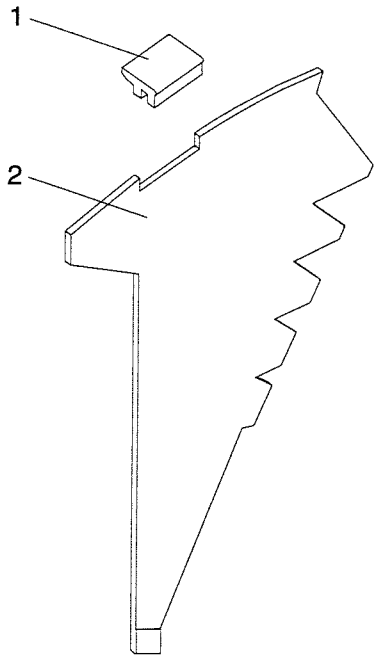
ASSY, *VL5B* SWP/CCF FILTER



4.2.20 *VL5Arc* Douser Panel Assembly

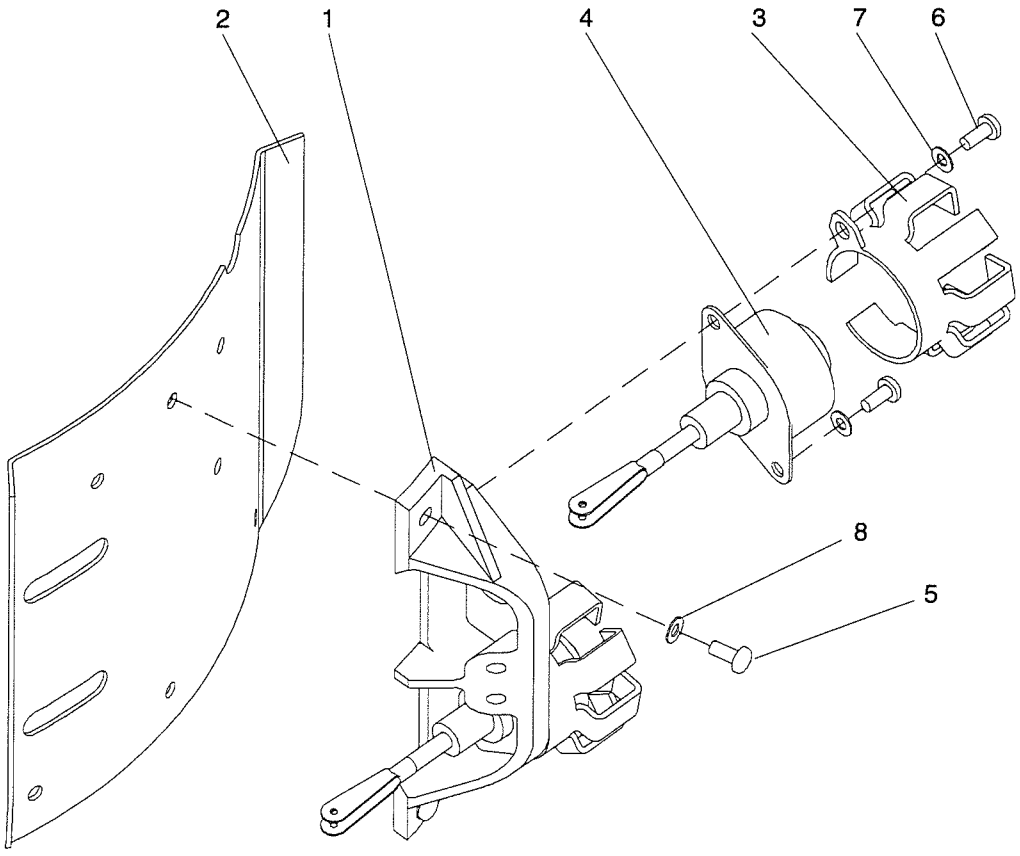
4.2.20.1 Assy, Dimmer Blade (*VL5Arc* Only) 22.9647.0136

NO.	PART NO.	QTY	DESCRIPTION
1	10.9634.0067	1 EA	PAD, FILTER, EXTRUSION, SILICONE, WHITE
2	10.9647.0125	1 EA	DIMMER BLADE, VL5Arc



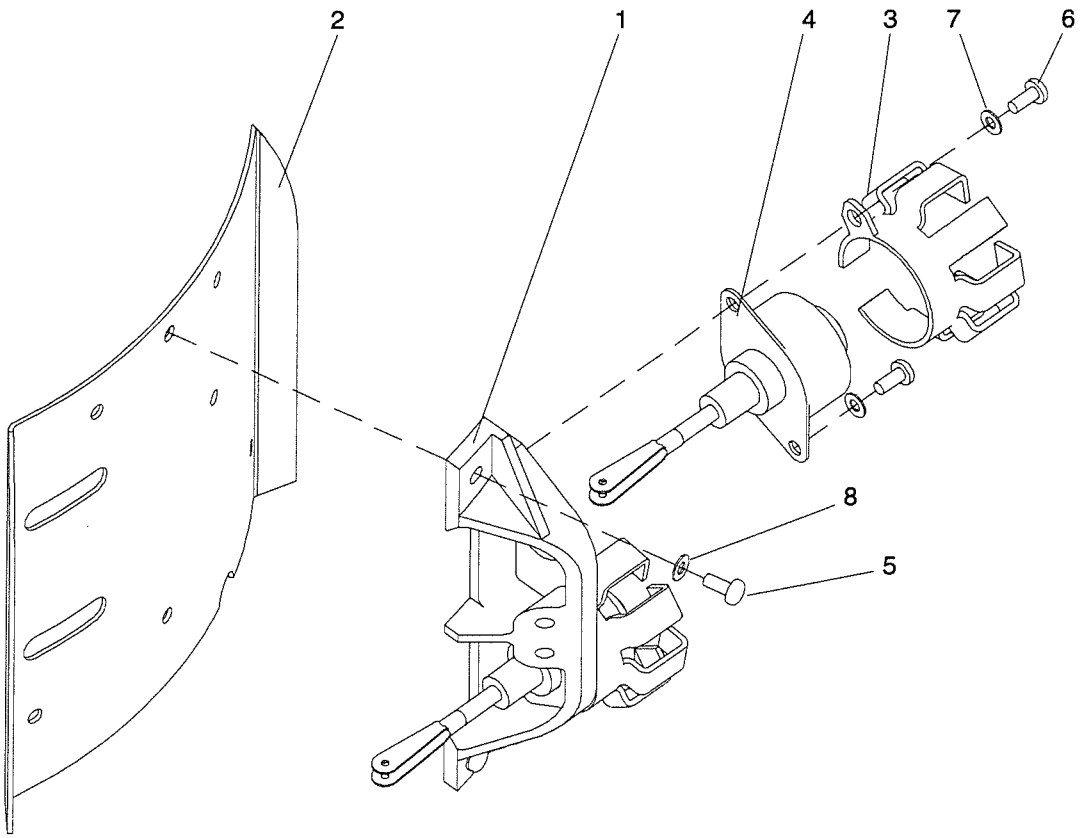
4.2.21 Assy, *VL5* Blu/Amb Motor 22.9634.0121

NO.	PART NO.	QTY	DESCRIPTION
1	10.9634.0061	1 EA	ACTUATOR MOUNT, VL5
2	10.9634.0075	1 EA	HEAT SHIELD, BLUE/AMBER
3	10.9634.0141	2 EA	HEAT SINK, MODIFIED ACTUATOR
4	22.9634.0128	2 EA	ASSY, VL5 LINEAR ACTUATOR
	44.9634.0128	1 EA	MOTOR, LINEAR ACTUATOR
	54.1217.0004	1 EA	LINK, VL5 ACTUATOR/DRIVE RING (6441-P)
5	53.6520.0001	3 EA	SCREW, 4-40X3/8"PPZ
6	55.2203.0001	4 EA	SCREW, 4-40X1/4"PPZ
7	55.6537.0001	4 EA	WASHER, LOCK #4 INTERNAL TOOTH
8	55.6621.0001	3 EA	WASHER, FLAT #4 ID.120 .028THK



4.2.22 Assy, *VL5* Mag/Dif Motor 22.9634.0122

NO.	PART NO.	QTY	DESCRIPTION
1	10.9634.0061	1 EA	ACTUATOR MOUNT, VL5
2	10.9634.0074	1 EA	HEAT SHIELD, MAGENTA/DIFFUSER
3	10.9634.0141	2 EA	HEAT SINK, MODIFIED ACTUATOR
4	22.9634.0128	2 EA	ASSY, VL5 LINEAR ACTUATOR
	44.9634.0128	1 EA	MOTOR, LINEAR ACTUATOR
	54.1217.0004	1 EA	LINK, VL5 ACTUATOR/DRIVE RING (6441-P)
5	53.6520.0001	3 EA	SCREW, 4-40X3/8"PPZ
6	55.2203.0001	4 EA	SCREW, 4-40X1/4"PPZ
7	55.6537.0001	4 EA	WASHER, LOCK #4 INTERNAL TOOTH
8	55.6621.0001	3 EA	WASHER, FLAT #4 ID.120 .028THK



4.2.23 Assy, *VL5, VL5B, VL5Arc* Yoke
22.9634.0010 (*VL5*)
22.9634.0222 (*VL5B*)
21.9647.0003 (VL5Arc)

NO.	PART NO.	QTY	DESCRIPTION
1	06.6018.0001	4 IN	VELCRO LOOP. 5/8"BLK ADHESIVE BACKED
2	10.9628.0211	2 EA	STABILIZER, PAN/TILT
3	10.9634.0095	2 EA	HEAT SHIELD, YOKE LEG
4	10.9634.0096	1 EA	HEAT SHIELD, YOKE CROSS MEMBER
5	10.9634.0111	1 EA	YOKE BOTTOM CROSS MEMBER, VL5
6	10.9634.0113	1 EA	YOKE LEG, VL5 BOARD SIDE
7	10.9634.0114	1 EA	LINER, PAN TUBE
8	10.9634.0149	1 EA	CAP, TILT TUBE, VL5
9	10.9634.0153	2 EA	BRACKET, COVER, YOKE
10	10.9634.0155	1 EA	TUBE, VL5 PIGTAIL PAN
11	10.9634.0171	2 EA	PULLEY, PTA DRIVEN
12	10.9634.0174	2 EA	COLLET, PTA DRIVEN PULLEY
13	10.9634.0175	1 EA	RING, PAN STOP
14	10.9647.0110	1 EA	LCB INSULATOR SHEET, VL5 (*VL5&VL5B Only*)
15	22.9634.0009	2 EA	ASSY, VL5 PAN/TILT MECHANISM
16	22.9634.0110	1 EA	CROSS MEMBER ASSY, YOKE
17	22.9634.0112	1 EA	YOKE LEG, VL5 TILT SIDE
18	24.9634.0070	1 EA	PCB ASSY, VL5 LAMP CONTROL (*VL5* Only)
19	24.9634.0070.01	1 EA	PCB ASSY, VL5B LAMP CONTROL (*VL5B* Only)
20	25.9634.0116	1 EA	CABLE ASSY, VL5 TILT
21	25.9634.0117	1 EA	CABLE ASSY, VL5 PAN
22	25.9634.0180	1 EA	CABLE ASSY, VL5 INPUT W/ GRN-YEL (*VL5&VL5B* Only)
23	25.9638.0243	1 EA	GROUND CABLE ASSEMBLY
	52.8251.0005	2 EA	TERM, RING #6 BLUE 16-14AWG
	73.7089.0504	4x16 IN	WIRE, 22AWG 300V 200C TEF GRN/YEL
24	52.6396.2804	4 EA	RECEPT.MTA100 W/TAB GRN 4 POS.
25	52.6424.0004	4 EA	COVER, STRAIN RELIEF/4POS MTA
26	52.8295.0002	1 EA	TERMINAL STRIP, 300V 12AWG 20A 2 POS.
27	53.2002.0001	3 EA	NUT, 6-32 KEP ZINC PLATED
28	53.2002.0003	1 EA	NUT, 6-32 HEX Z NY INSERT
29	53.2002.0004	8 EA	NUT, 6-32, Acorn, Threadlocking, SS
30	53.2003.0001	4 EA	NUT, 4-40, KEP ZINC PLATED
31	53.5508.0375	16 EA	SCREW, 8-32X3/8"PPSS
32	53.5536.0375	1 EA	SCREW, 6-32 X 3/8" PFSS
33	53.5638.0375	12 EA	SCREW, 8-32 X 3/8 PFSS BLK
34	53.5710.0100	1 EA	SCREW, 10-32X1"SCSS

Assy, *VL5, VL5B, VL5Arc* Yoke (Continued)

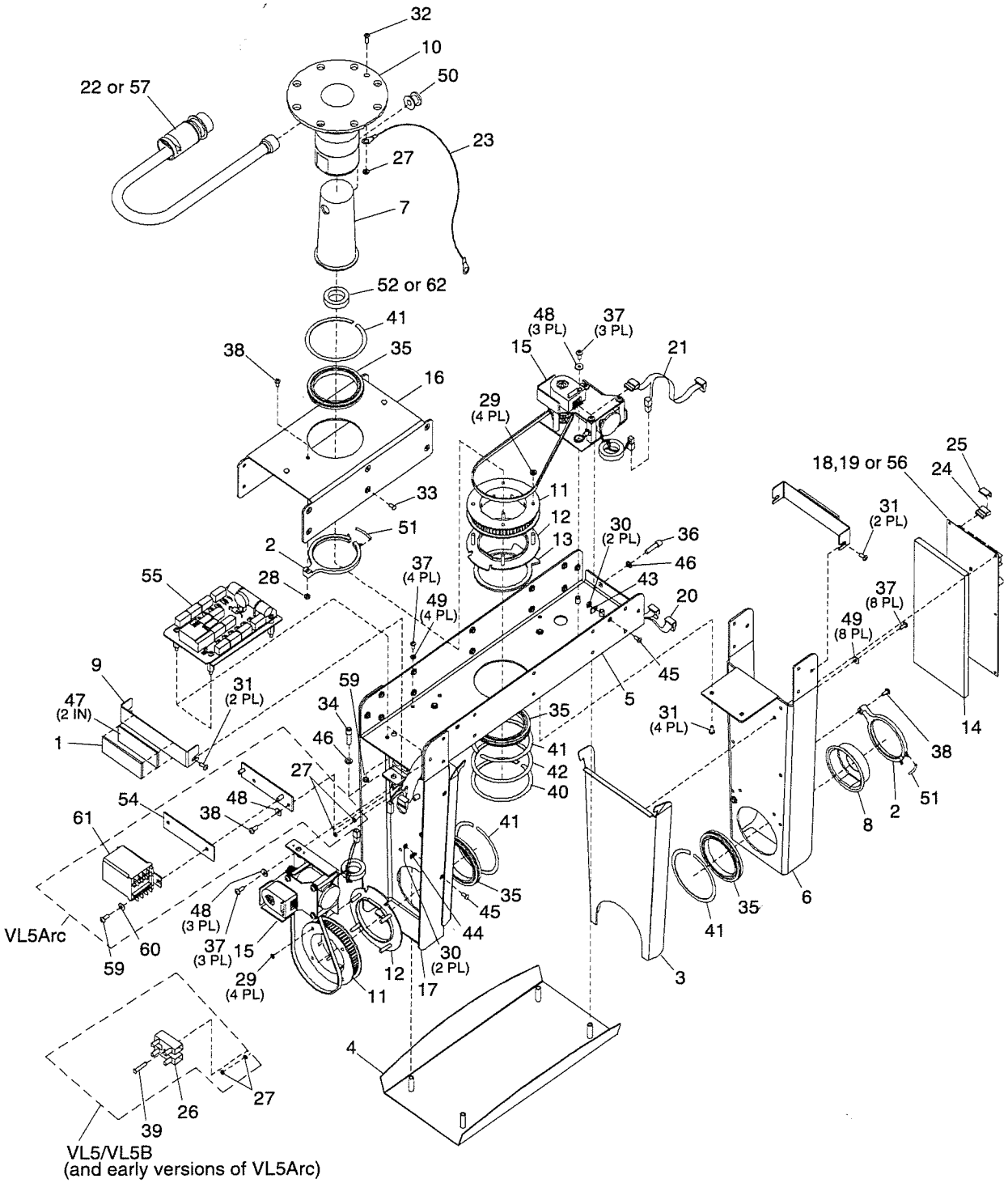
NO.	PART NO.	QTY	DESCRIPTION
35	53.6506.0001	4 EA	BEARING, TORQUE TUBE,2.6250OD X 2.0620ID
36	53.6514.0002	1 EA	SCREW, 10-32 X 1 1/4" SCSS
37	53.6525.0001	18 EA	SCREW, 6-32X5/16"PPZ
38	53.6526.0001	4 EA	SCREW, 6-32X5/8"PPZ
39	53.6616.0001	1 EA	SCREW, 6-32X3/4"PPZ
40	54.1205.0001	1 EA	RING, RETAINING 1.963" ID
41	54.1206.0001	4 EA	RING, RETAINING 2.521" ID
42	55.2129.0002	1 EA	SHIM, STAINLESS STEEL, PAN TUBE
43	55.2177.0001	2 EA	CABLE ANCHOR MOUNT, BLACK
44	55.2178.0001	2 EA	CABLE ANCHOR MOUNT, # 8 SCREW MOUNTING
45	55.2201.0001	4 EA	SCREW, 4-40X5/16"PFB
46	55.3301.0010	2 EA	WASHER, FLAT #10
47	55.6507.0003	6 IN	WEATHER STRIP, 1/8"X1"X50' ADH.BACK
48	55.6517.0001	8 EA	WASHER, FLAT, STEEL .375ODX.150IDX.031THK
49	55.6538.0001	12 EA	WASHER, LOCK, #6 INTERNAL TOOTH
50	55.6579.0008	1 EA	GROMMET, 5/16 ID X 3/8 HOLE
51	55.6603.0001	2 EA	SPRING, SS 4.6#/IN. EXTENSION
52	67.4008.0001	1 EA	BEAD, EMI SHIELD .748 I.D. FERRITE (installed on VL5 Input Cable Assy) (*VL5&VL5B* Only)

***VL5Arc* Luminaire Only**

NO.	PART NO.	QTY	DESCRIPTION
53	10.9647.0123	1 EA	RELAY ADAPTER PLATE, VL5Arc & VL6
54	10.9647.0131	1 EA	RELAY ADAPTER TOP PLATE, VL5Arc & VL6
55	23.9647.0047	1 EA	ASSY, VL5Arc IGNITOR BOARD
56	24.9638.0009.02	1 EA	ELEC. ASSY, VL5Arc LAMP CONTROL BOARD
57	25.9647.0128	1 EA	CABLE ASSY, VL5Arc INPUT, GRN-YEL
58	53.2002.0001	2 EA	NUT, 6-32 KEP ZINC PLATED
59	53.6558.0001	2 EA	SCREW, 6-32 X 3/8" PPZ
60	55.6538.0001	2 EA	WASHER, LOCK, #6 INTERNAL TOOTH
*61	66.4510.0002	1 EA	RELAY, 20A, 250VAC, DPDT, UL/CSA
62	67.4008.0001	1 EA	BEAD, EMI SHIELD .748 I.D. FERRITE

* - New **VL5Arc** luminaire versions contain a new relay (61) mounted on the yoke leg. The new relay replaces the 2 position terminal block (26) that inter-connected the lamp power cables. Lamp power cables will now connect to the relay, instead of the terminal block, using Fast-on connectors instead of the wire pins.

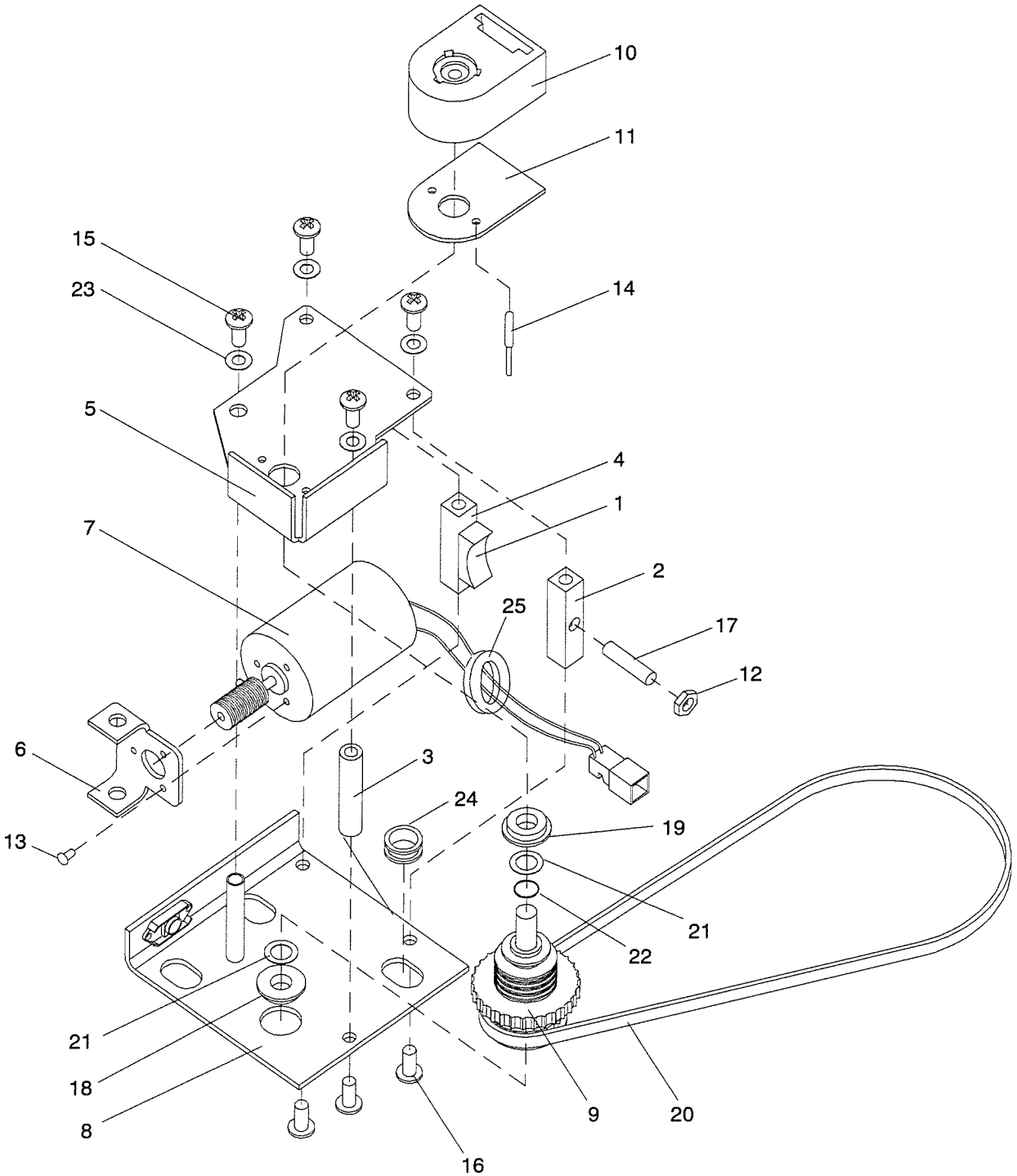
Assy, *VL5, VL5B, VL5Arc* Yoke (Continued)



4.2.24 Assy, *VL5* Pan/Tilt Mechanism 22.9634.0009

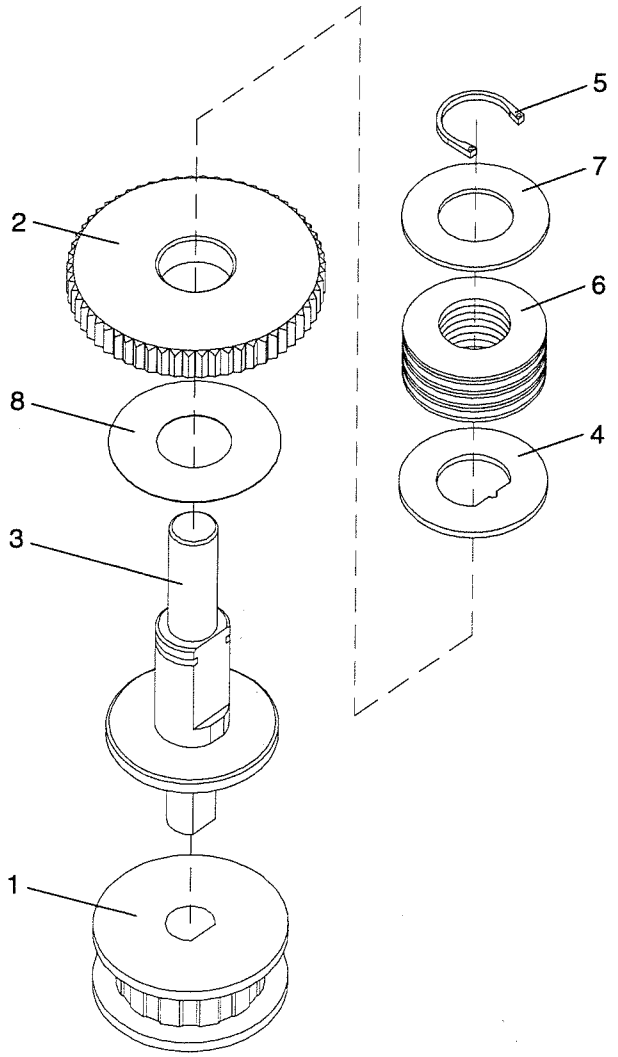
NO.	PART NO.	QTY	DESCRIPTION
1	10.9620.0293	1 EA	PAD, ANTI-BACKLASH, PTA
2	10.9628.0117	1 EA	SPACER, ADJUSTMENT, BACKLASH, TILT
3	10.9628.0143	1 EA	STANDOFF, SPECIAL, RND, 6-32X5/16X.187
4	10.9628.0144	1 EA	STANDOFF, SPECIAL, SQR, TILT MECHANISM
5	10.9634.0053	1 EA	PLATE, TOP, PTA
6	10.9634.0054	1 EA	MOUNT, MOTOR, PTA
7	22.5009.0002	1 EA	ASSY, VL5 MAXON MOTOR W/LEAD WIRES
	10.9634.0055	1 EA	WORM, PTA
	44.5009.0002	1 EA	MOTOR, W/O TACH, VL5 MAXON W/LEAD WIRES
	52.6435.2202	1 EA	CONN, MTA156 RED 2PIN (CBL-CBL)
	52.6436.0002	1 EA	COVER, STRAIN RELIEF/2POS MTA156
	53.5652.0125	1 EA	SCREW, SET, 2-56X1/8" KNURLED-END, BLK
8	22.9634.0052	1 EA	PLATE ASSY, BOTTOM, PTA
9	22.9634.0147	1 EA	ASSY, CLUTCH, VL5 PAN/TILT
	10.9628.0079	1 EA	PULLEY, DRIVE, TILT, VL4
	10.9634.0019	1 EA	GEAR, WORM,1MGRL17000
	10.9634.0045	1 EA	SHAFT,CLUTCH,PTA
	10.9634.0051	1 EA	WASHER,"D", PTA
	54.1222.0002	1 EA	RING,RETAIN.,METRIC,FOR 9MM SCREW
	55.2128.0001	7 EA	SPRING, DISC, CLUTCH, VL5
	55.6677.0007	1 EA	WASHER, FLAT,.75OD X.383ID X.031TH-BLK
	55.6677.0008	1 EA	WASHER,FLAT,S/S,.875OD X .3781
10	45.5105.0001	1 EA	ENCODER, OPTICAL, I06
11	.	1 EA	Encoder Mounting Plate (comes with Encoder)
12	53.2001.0001	1 EA	NUT, 10-32 KEPS, ZINC PLATED
13	53.6513.0004	3 EA	SCREW, 2MM X 4MM, PPSS
14	53.6534.0002	2 EA	RIVET, POP, ALUM. 3/32OD X 3/16 GRIP RAN
15	53.6558.0001	4 EA	SCREW, 6-32X3/8"PPZ
16	53.6609.0001	3 EA	SCREW, 6-32X3/8"PFZ
17	53.6667.0002	1 EA	SCREW, 10-32 X 3/4L SS SET OVAL TIP
18	54.1208.0001	1 EA	BEARING, 1/4"
19	54.1208.0003	1 EA	BEARING, 1/4"ID X 3/8"OD
20	54.2008.0001	1 EA	BELT, VL5, 1/5P, 80T, .290W, KEVLAR
21	55.2110.0002	2 EA	WSHR, FLT STN ST .260ID.400OD.010THK
22	55.2123.0001	1 EA	SPRING, WAVE 1/4"
23	55.6538.0001	4 EA	WASHER, LOCK, #6 INTERNAL TOOTH
24	55.6579.0003	3 EA	GROMMET, ISO/DAMP, VL5 PTA
25	67.4008.0001	1 EA	BEAD, EMI SHIELD .748 I.D. FERRITE

Assy, *VL5* Pan/Tilt Mechanism (Continued)



4.2.25 Assy, Clutch, *VL5* Pan/Tilt (Repair Part) 22.9634.0147

NO.	PART NO.	QTY	DESCRIPTION
1	10.9628.0079	1 EA	PULLEY, DRIVE, TILT, VL4
2	10.9634.0019	1 EA	GEAR, WORM,1MGRL17000
3	10.9634.0045	1 EA	SHAFT,CLUTCH,PTA
4	10.9634.0051	1 EA	WASHER,"D", PTA
5	54.1222.0001	1 EA	RING,RETAIN.,METRIC,FOR 9MM SHAFT
6	55.2128.0001	7 EA	SPRING, DISC, CLUTCH, VL5
7	55.6677.0007	1 EA	WASHER, FLAT,.75OD X.383ID X.031TH-BLK
8	55.6677.0008	1 EA	WASHER,FLAT,S/S,.875OD X .3781



4.2.26 PCB Assy, *VL5, VL5B* LCB 24-9634-0070 (VL5) 24.9634.0070.01 (VL5B)

PART NO.	QTY	REF DES	DESCRIPTION
11.9634.0071	1 EA	BLANK BOARD	PCB, VL5
53.5508.0500	1 EA	HANDLE	SCREW, 8-32X1/2"PPSS
55.3303.0008	1 EA	HANDLE	WASHER, LOCK, INT.TOOTH #8SS
55.6703.0001	1 EA	HANDLE	HANDLE, VL5 PCB, BLACK
87.7155.0002	1 EA	U8	EPROM, PGMD:27C010A-10/ VL5 v2.0 (*VL5 Only*)
87.7224.0001	1 EA	U8	EPROM, PGMD:27C010A-10/ VL5B v1.0 (*VL5B Only*)
22.9634.0104	**REF*		*KIT, COMPONENTS, VL5 PCB ASSY*
50.2708.0001	6 EA	XU21, 26-29, XF1	SOCKET, 8PIN DIP
50.2714.0001	2 EA	XU9, 20	SOCKET, 14PIN DIP
50.2732.0001	3 EA	XU11-13	SOCKET, 32PIN DIP
51.5017.0001	1 EA	U22	HEATSINK, 7128D, TO-220
51.5018.0001	2 EA	U23, 24	HEATSINK, 7148D, TO-220
52.5000.0001	1 EA	P6	TERM STRIP, TSW, 4PIN, D-ROW
52.5000.0002	1 EA	XU16	SOCKET, 132PIN, PQFP, PGA, ADVANCED INTRCON
52.5000.0003	1 EA	XU16	COVER, SOCKET 132 POS PQFP 821942-1
52.5000.0004	1 EA	XU16	SOCKET,132POS, PQFP, #821949-5
52.5000.0016	10 EA	XU1-8, 14, 17	SOCKET, 16PIN, DIP, TINNED
52.5000.0020	4 EA	XU10, 15, 18, 19	SOCKET, 20PIN, DIP, TINNED
52.6240.0001	1 EA	P3	HEADER, MTA FRCT LOK STRT POST 6PIN
52.6259.0001	2 EA	P7B, P8B	HEADER, MTA FRCT LOK STRT POST 5PIN
52.6284.0001	6 EA	P1, 2, 4, 5, 9	HEADER, MTA FRCT LOK STRT POST 4PIN
52.6297.0001	4 EA	P7A, P8A,P10A, P10B	HEADER, MTA FRCT LOK STRT POST 2PIN
52.6433.0001	1 EA	AF1	PLUG, ADAPTER, 8PIN, LCP, SAMTEC
52.8284.0001	3 EA	J2-J4	TERM STRIP, 2-PIN STRAIGHT GOLD CONTACT
52.8402.0002	1 EA	J1	JACK, MODULAR, 8PIN STRAIGHT
60.1420.2703	2 EA	R7, 8	RES, 1/4W 5% 2.7K
60.1422.1001	4 EA	R5, 6, 10, 13	RES, 1/4W 5% 1K CF
60.1424.4703	1 EA	R1	RES, 1/4W 5% 470 CF
60.1425.1003	1 EA	R11	RES, 1/4W 5% 100 OHMS CF
60.1425.5603	1 EA	R2	RES, 1/4W 5% 560 OHMS CF
60.1429.3303	2 EA	R8, 12	RES, 1/4W 5% 330 CF
60.1429.3305	1 EA	R3	RES, 1/4W 5% 330K CF
60.5000.0002	1 EA	R4	RES, 1/4W 5% 20M
61.4306.0472	3 EA	RP1, 5, 14	RES SIP, 472 6PIN BUSSED LW PRFLE
61.4310.0103	11 EA	RP2-4, 6-13	RES SIP, 103 10PIN BUSSED
62.2013.0104	33 EA	C1-8, 13-19, 24-26, 28-39, 45, 47, 48, 55, 56	CAP, .1UF, 50V, AXL, CERAMIC, .100", 20%
62.2034.0206	2 EA	C27, 28	CAP, 20PF, 50V, SIP, CERAMIC, .100", 5%
62.2094.0106	6 EA	C9-12, 41, 44	CAP, 10UF, 35V, RAD, ALUMINUM
62.2099.0104	1 EA	C29	CAP, .1UF, 50V, SIP, CERAMIC, .100", 10%

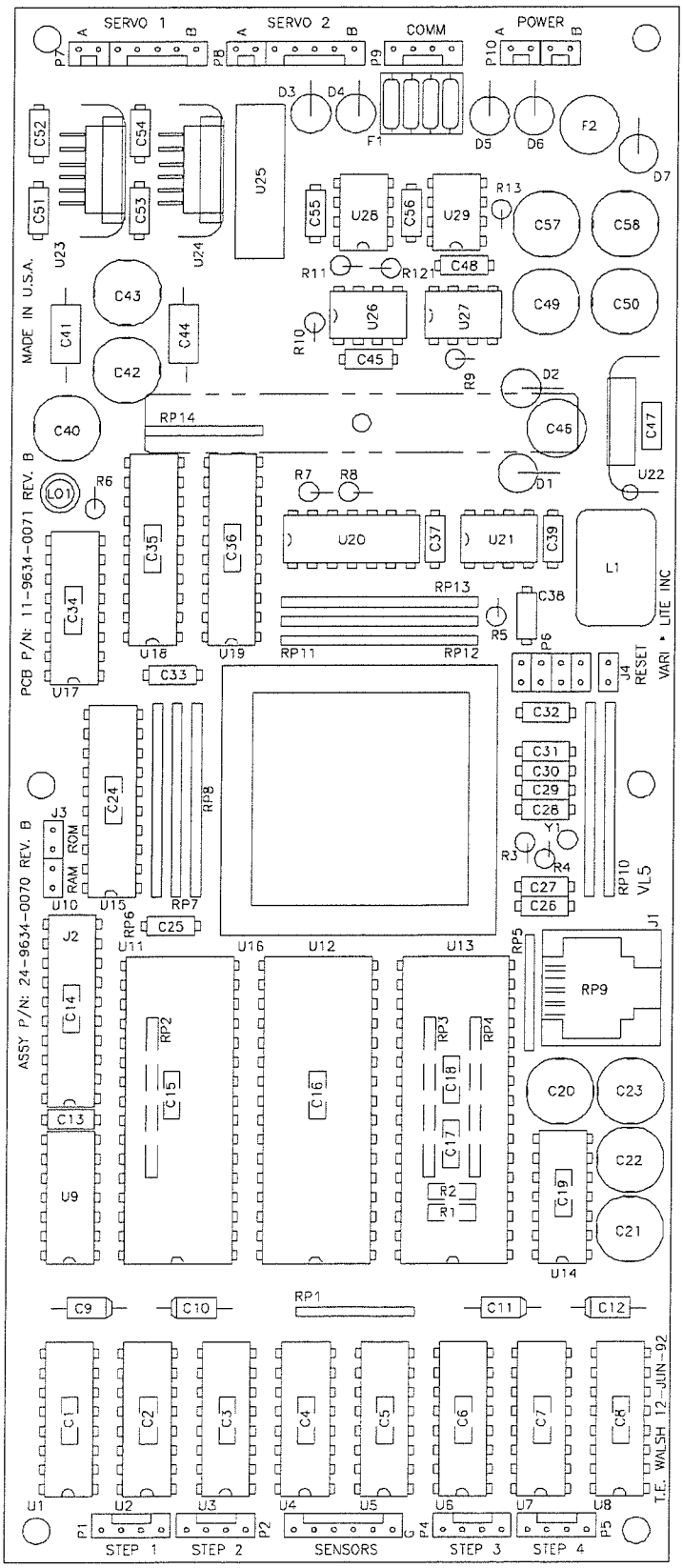
* - Kit contains parts listed below.

PCB Assy, *VL5, VL5B* LCB (Continued)

PART NO.	QTY	REF DES	DESCRIPTION
22.9634.0104	**REF*	*continued*	*KIT, COMPONENTS, VL5 PCB ASSY*
62.5002.0103	4 EA	C51-54	CAP, .01UF, 50V, RAD, CERAMIC
62.3002.0477	1 EA	C46	CAP, 470UF, 10V, RAD, ALUMINUM
62.3005.0477	11 EA	C20-23, 40, 42, 43, 49, 50, 57	CAP, 470UF, 35V, RAD, ALUMINUM
64.4003.0001	1 EA	Y1	CRYSTAL, 32.768 KHZ
68.4525.0004	1 EA	L1	INDUCTOR, 680UF, PULSE #PE52649
70.3729.0001	4 EA	F1	FUSE, 1/16A, 125V, PICO II
70.3731.0001	1 EA	F2	FUSE, 5AMP, 19374K, TR5-T TIME LAG
70.3732.0001	1 EA	XF2	FUSEHOLDER, TR5, 19560
82.4309.5401	1 EA	D2	DIODE, RECTIFIER, 1N5401 100V 3A
82.4316.5822	1 EA	D1	DIODE, SCHOTTKY, 1N5822 40V 3A
82.5301.5908	4 EA	D3-6	DIODE, ZENER TS, 1N5908 5V 5W
82.5316.6281	1 EA	D7	DIODE, ZENER, 1N6281 27V 1500W 10%
83.3157.0001	2 EA	U26, 27	IC, 6N137, OPTOCOUPLER
83.5000.0001	4 EA	U2, 3, 6, 7	IC, L293D, QUAD HALF-BRIDGE DRIVER
83.5000.0003	1 EA	U22	IC,LM2575T-5.0, VOLTAGE REG., SWITCHING
83.5000.0004	2 EA	X23, 24	IC,LMD18200, H-BRIDGE, 55V, 3A
84.0068.0332	1 EA	U16	IC, 68332, MICROPROCESSOR
84.4131.0001	1 EA	U20	IC, 74HC05 HEX INVERTER W/OPEN COLLECTOR
84.4234.0001	2 EA	U28, 29	IC, LTC485, RS422/RS485 TRANSCEIVER
84.5000.0004	1 EA	U9	IC, 74HC32, QUAD 2-INPUT OR GATE
84.5000.0014	2 EA	U12, 13	IC,581001-70, 128K X 8,S-RAM,70SPEED
84.7407.0174	5 EA	U1, 4, 5, 8, 17	IC, 74HC174 HEX D-FF W/CLR
84.7411.0001	1 EA	U25	IC, HPR100, DC TO DC CONVERTER, 5V IN/OUT
85.5000.0701	1 EA	U21	IC,MAX701, PWR SUPPLY MONITOR
85.5104.0002	2 EA	U18, 19	IC,HCTL-2020, DECODER
85.5119.0001	1 EA	U14	IC, 75173, QUAD DIF.LINE RCVR
87.7129.0015	1 EA	U15	IC, LOGIC PGM:VL5 U15 2614
87.7132.0002	I EA	U10	IC, LOGIC PGM:VL5 U10 2624
88.8101.0001	1 EA		LED, RED HP

* - Kit contains parts listed below.

PCB Assy, *VL5, VL5B* LCB (Continued)



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4.2.27 PCB Assy, *VL6* Control (*VL5Arc* Only) 24.9638.0009.02

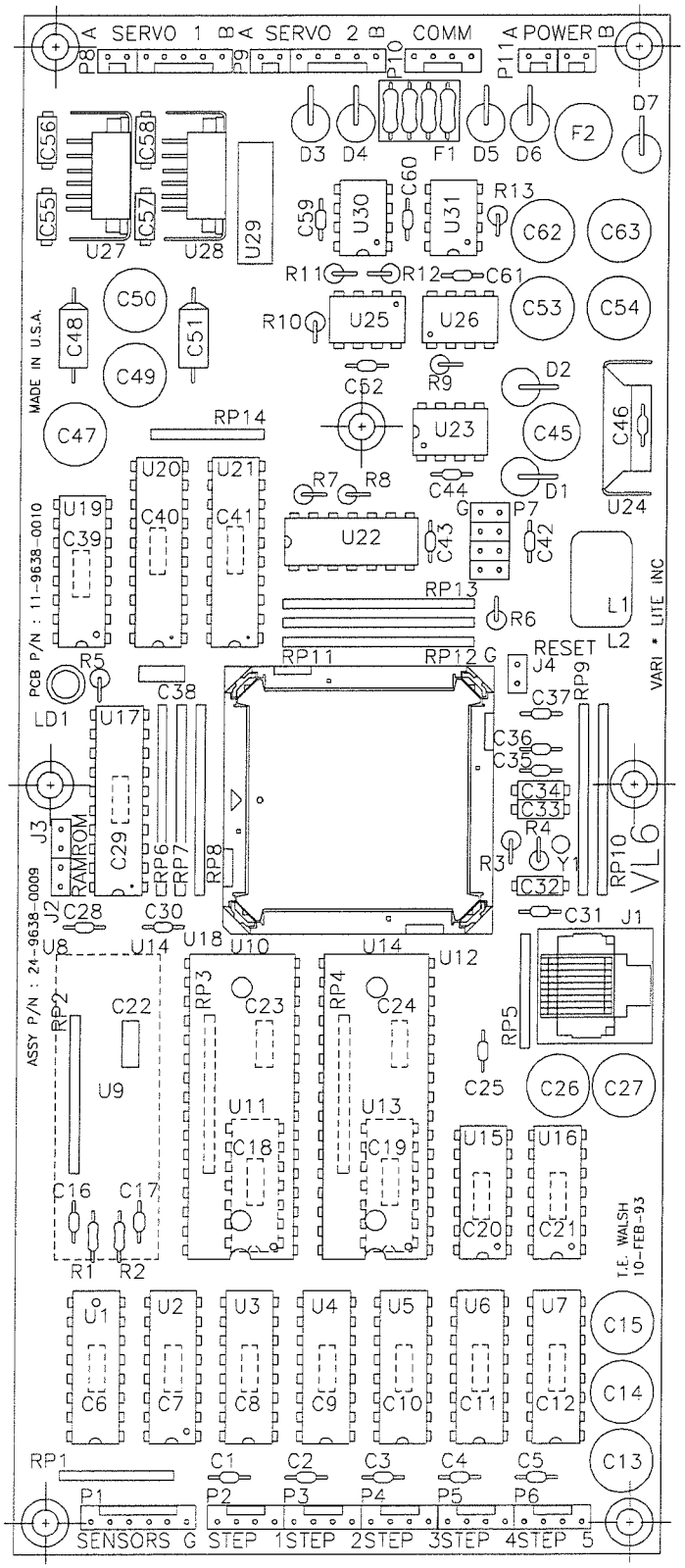
PART NO.	QTY	REF DES	DESCRIPTION
11.9638.0010	1 EA		PCB, VL6 CONTROL
87.7159.0001	1 EA	U11	
52.5000.0002	1 EA	XU18	SOCKET,132PIN,PQFP,PGA,ADVANCEDINTRCON
53.5508.0500	1 EA	AP: HANDLE	SCREW, 8-32X1/2"PPSS
55.3303.0008	1 EA	AP: HANDLE	WASHER, LOCK, INT.TOOTH #8SS
55.6703.0001	1 EA	HANDLE	HANDLE, VL5 PCB, BLACK
22.9638.0087	**REF*		*KIT, COMPONENTS, VL6 PCB ASSY*
50.2708.0001	6 EA	XU21, 26-29, XF1	SOCKET, 8PIN DIP
50.2714.0001	1 EA	XU9, 20	SOCKET, 14PIN DIP
51.5017.0001	1 EA	U22	HEATSINK, 7128D, TO-220
51.5018.0001	2 EA	U23, 24	HEATSINK, 7148D, TO-220
52.5000.0001	1 EA	P6	TERM STRIP,TSW,4PIN,D-ROW
52.5000.0003	1 EA	XU16	COVER,SOCKET,132POS,PQFP,821942-1
52.5000.0004	1 EA	XU16	SOCKET,132POS,PQFP,#821949-5
52.5000.0016	10 EA	XU1-8, 14, 17	SOCKET, 16PIN,DIP,TINNED
52.5000.0020	4 EA	XU10, 15, 18, 19	SOCKET, 20PIN,DIP,TINNED
52.6240.0001	1 EA	P3	HEADER, MTA FRCT LOK STRT POST 6PIN
52.6259.0001	2 EA	P7B, 8B	HEADER, MTA FRCT LOK STRT POST 5PIN
52.6284.0001	6 EA	P1, 2, 4, 5 , 9	HEADER, MTA FRCT LOK STRT POST 4PIN
52.6297.0001	2 EA	P7A, 8A, 10A, 10B	HEADER, MTA FRCT LOK STRT POST 2PIN
52.6373.0004	4 EA		SOCKET STRIP,SINGLE ROW,12POS,LOW PRO.
52.6373.0005	2 EA		SOCKET STRIP,SINGLE ROW, 8POS,LOW PRO.
52.6373.0007	4 EA		SOCKET STRIP,DOUBLE ROW, 8POS
52.6373.0008	4 EA		SOCKET STRIP,SINGLE ROW, 8POS, TIN
52.6374.0007	2 EA	XU14	SOCKET STRIP,SINGLE ROW,7POS,LOW PROF.
52.6433.0001	1 EA	F1	PLUG, ADAPTER, 8PIN, LCP, SAMTEC
52.6437.0001	6 EA	XU8, 10, 12	SOCKET STRIP, 16POS ELEVATED .33"
52.8284.0001	3 EA	J2-4	TERM STRIP, 2-PIN STRAIGHT GOLD CONTACT
52.8402.0002	1 EA	J1	JACK, MODULAR, 8PIN STRAIGHT
60.1420.2703	2 EA	R7, 8	RES, 1/4W 5% 2.7K
60.1422.1001	4 EA	R5, 6, 10, 13	RES, 1/4W 5% 1K CF
60.1424.4703	1 EA	R1	RES, 1/4W 5% 470 CF
60.1425.1003	1 EA	R11	RES, 1/4W 5% 100 OHMS CF
60.1425.5603	1 EA	R2	RES, 1/4W 5% 560 OHM CF
60.1429.3303	2 EA	R8, 12	RES, 1/4W 5% 330 CF
60.1429.3305	1 EA	R3	RES, 1/4W 5% 330K CF
60.5000.0002	1 EA	R4	RES, 1/4W 5% 20M
61.4306.0103	1 EA	RP14	RES SIP, 103 6PIN BUSSED LW PROFILE
61.4306.0472	2 EA	RP1, 5	RES SIP, 472 6PIN BUSSED LW PRFLE
61.4310.0103	11 EA	RP2-4, 6-13	RES SIP, 103 10PIN BUSSED
62.2013.0104	36 EA	C1-8, 13-19, 24-26, 28-39, 45, 47, 48, 55, 56	CAP,.1UF, 50V,AXL,CERAMIC, .100",20%
62.2034.0206	2 EA	C27, 28	CAP,20PF, 50V,SIP,CERAMIC, .100", 5%
62.2094.0106	7 EA	C9-12, 41, 44	CAP,10UF, 35V,RAD,ALUMINUM
62.2099.0104	1 EA	C29	CAP,.1UF, 50V,SIP,CERAMIC, .100",10%
62.3002.0103	4 EA	C51-54	CAP, .01UF, 50V,RAD,CERAMIC

* - Kit contains parts listed below.

PCB Assy, *VL6* Control (*VL5Arc* Only) (Continued)

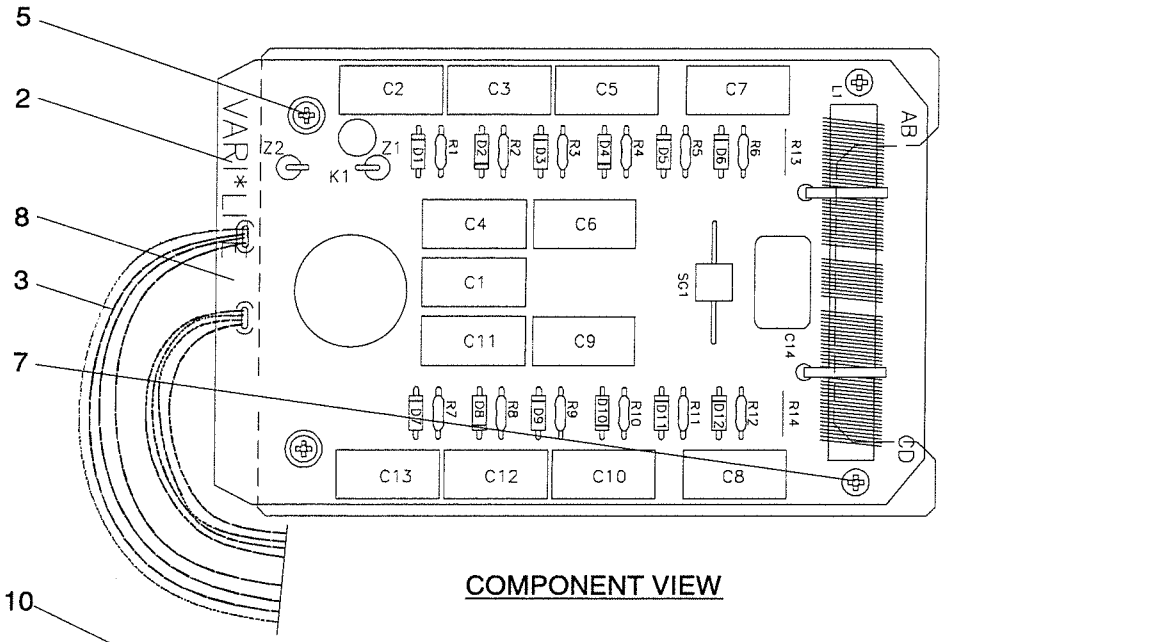
PART NO.	QTY	REF DES	DESCRIPTION
62.3002.0477	1 EA	C46	CAP, 470UF, 10V,RAD,ALUMINUM
62.3005.0477	12 EA	C20-23, 40, 42, 43, 49, 50, 57	CAP,470UF, 35V,RAD,ALUMINUM
64.4003.0001	1 EA	Y1	CRYSTAL, 32.768 KHZ
68.4525.0006	1 EA	L1	INDUCTOR,470UF,PE52648
70.3729.0001	4 EA	F1	FUSE,1/16A, 125V, PICO II
70.3731.0001	1 EA	F2	FUSE,5AMP, 19374K, TR5-T TIME LAG
70.3732.0001	1 EA	XF2	FUSEHOLDER, TR5, 19560
82.4309.5401	1 EA	D2	DIODE, RECTIFIER, 1N5401100V 3A
82.4316.5822	1 EA	D1	DIODE, SCHOTTKY , 1N5822 40V 3A
82.5301.5908	4 EA	D3-6	DIODE, ZENER TS , 1N5908 5V 5W
82.5316.6281	1 EA	D7	DIODE,ZENER, 1N6281 27V 1500W 10%
83.3157.0001	2 EA	U26, 27	IC, 6N137, OPTOCOUPLER
83.5000.0001	5 EA	U2, 3, 6, 7, 15	IC, L293D, QUAD HALF-BRIDGE DRIVER
83.5000.0003	1 EA	U22	IC,LM2575T-5.0,VOLTAGE REG.,SWITCHING
83.5000.0004	2 EA	X23, 24	IC,LMD18200,H-BRIDGE,55V,3A
84.0068.0332	1 EA	U16	IC, 68332, MICROPROCESSOR
84.4131.0001	1 EA	U20	IC, 74HC05 HEX INVERTER W/OPEN COLLECTOR
84.4234.0001	2 EA	U28, 29	IC, LTC485,RS422/RS485 TRANSCEIVER
84.5000.0004	1 EA	U11	IC, 74HC32, QUAD 2-INPUT OR GATE
84.5000.0014	2 EA	U12, 13	IC,581001-70,128K X 8,S-RAM,70SPEED
84.7407.0174	6 EA	U1, 4, 5, 8, 17	IC, 74HC174 HEX D-FF W/CLR
84.7411.0001	1 EA	U25	IC, HPR100,DC TO DC CONVERTER,5V IN/OUT
85.5000.0701	1 EA	U21	IC,MAX701,PWR SUPPLY MONITOR
85.5104.0002	2 EA	U18, 19	IC,HCTL-2020, DECODER
85.5119.0001	1 EA	U14	IC, 75173,QUAD DIF.LINE RCVR
87.7132.0002	1 EA	U10	IC, LOGIC PGM:VL5 U10 2624
87.7145.0000	1 EA	U9	IC,GAL 22V10 (BLANK)
88.8101.0001	1 EA	LED1	LED, RED HP

PCB Assy, *VL6* Control (*VL5Arc* Only) (Continued)

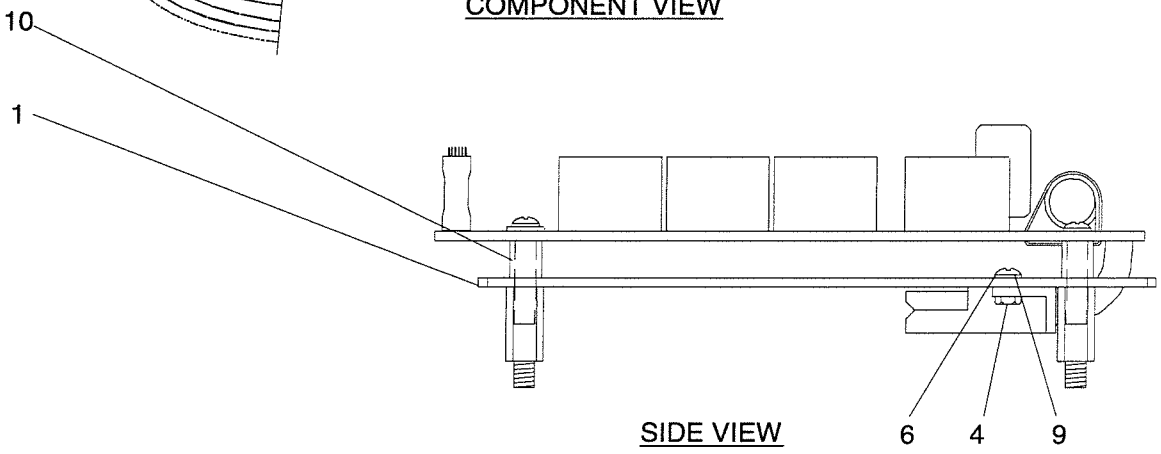

P8 A SERVO 1 B
P9 A SERVO 2 B
P10 COMM
P11 A POWER B
MADE IN U.S.A.
PCB P/N : 11-9638-0010
ASSY P/N : 24-9638-0009
VARI • LITE INC
VL6
T.E. WALSH 10-FEB-93
SENSORS G STEP 1STEP 2STEP 3STEP 4STEP 5
RESET
RAMROM
LD1
U1 U2 U3 U4 U5 U6 U7 U8 U9 U10 U11 U12 U13 U14 U15 U16 U17 U18 U19 U20 U21 U22 U23 U24 U25 U26 U27 U28 U29 U30 U31
C1 C2 C3 C4 C5 C6 C7 C8 C9 C10 C11 C12 C13 C14 C15 C16 C17 C18 C19 C20 C21 C22 C23 C24 C25 C26 C27 C28 C29 C30 C31 C32 C33 C34 C35 C36 C37 C38 C39 C40 C41 C42 C43 C44 C45 C46 C47 C48 C49 C50 C51 C52 C53 C54 C55 C56 C57 C58 C59 C60 C61 C62 C63
R1 R2 R3 R4 R5 R6 R7 R8 R9 R10 R11 R12 R13
RP1 RP2 RP3 RP4 RP5 RP6 RP7 RP8 RP9 RP10 RP11 RP12 RP13 RP14
P1 P2 P3 P4 P5 P6 P7
J1 J2 J3 J4
D1 D2 D3 D4 D5 D6 D7
F1 F2
L1 L2
Y1

4.2.28 Assy, *VL5Arc* Ignitor Board (*VL5Arc* Only) 23.9647.0047

NO.	PART NO.	QTY	DESCRIPTION
1	10.9638.0064	1 EA	BRACKET, MOUNTING, IGN6 PCB
2	24.9647.0133	1 EA	PCB ASSY, IGNITOR,VL5ARC/VL6
3	25.9647.0048	1 EA	CABLE ASSY, VL5Arc IGNITOR
4	53.2016.0002	2 EA	NUT, 4-40 HEX ZINC
5	53.5506.0500	2 EA	SCREW, 6-32 x 1/2" PPSS
6	53.6569.0001	2 EA	SCREW, 4-40 X 5/16"PPZ
7	53.6613.0500	2 EA	SCREW, 6-32 X 1/2" PPN NYLON
8	55.2186.0001	1 EA	CABLE TIE, SMALL .10X4"
9	55.3303.0006	2 EA	WASHER, LOCK, INT. TOOTH #6SS
10	55.6658.0006	4 EA	STANDOFF, 1/4" HEX 6-32 X 9/16" MFSS



COMPONENT VIEW

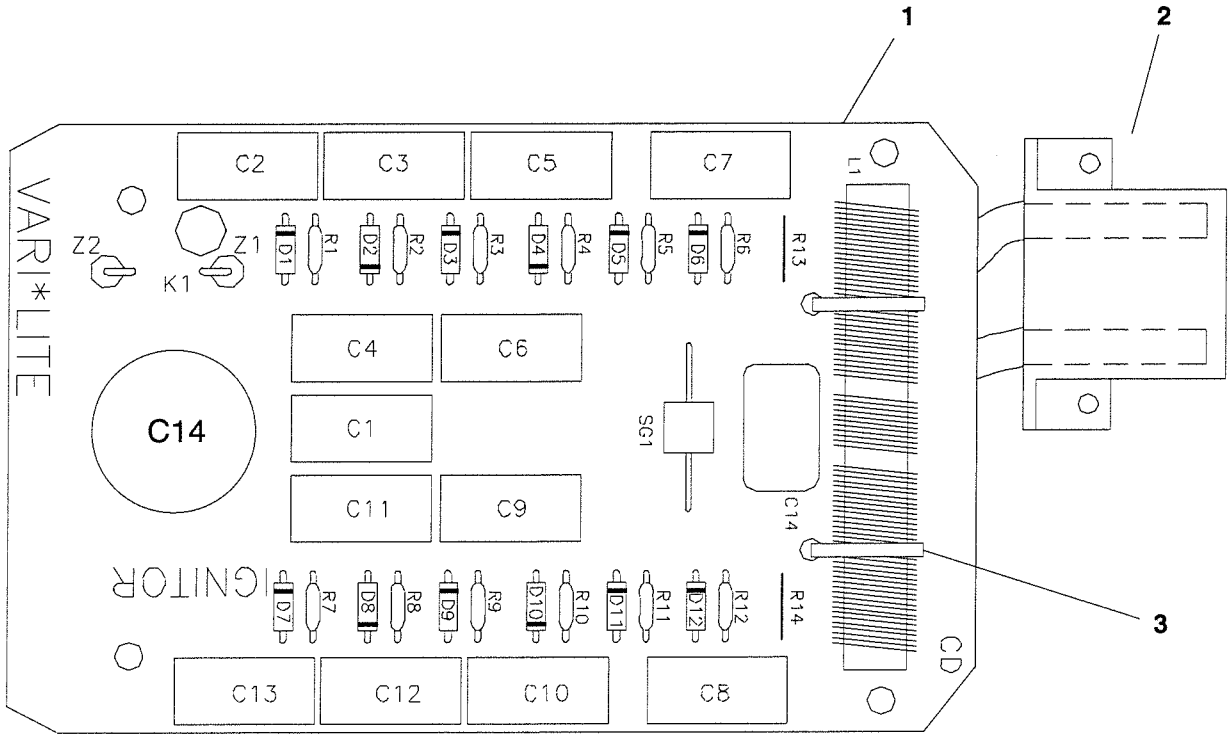


SIDE VIEW

4.2.29 PCB ASSY, IGNITOR,VL5ARC/VL6 (*VL5Arc* Only) 24.9647.0133

PART NO.	QTY	REF DES	DESCRIPTION
11.9647.0133	1 EA	ITEM 1	PCB, IGNITOR, VL5ARC/VL6
25.9638.0222	1 EA	ITEM 2	CABLE ASSY, IGNITOR BOARD OUTPUT
52.6264.0003	1 EA	part of ITEM 2	CONN HOUSING, 30 SERIES W/FLNGS 3POS
52.8247.0002	2 EA	part of ITEM 2	CRIMP CONTACT, S30 TIN
73.7027.0001	4 IN	part of ITEM 2	WIRE, 16AWG 30KV CHAMPLAIN ONLY 3239B
55.2186.0001	2 EA	ITEM 3	CABLE TIE, SMALL .10X4"
60.1422.1002	12 EA	R1-12	RES, 1/4W 5% 10MEG CF
62.2032.0001	1 EA	C14	CAP, .01UF, 3000V, RAD, CERAMIC, .375", 20%
62.3000.0033	13 EA	C1-13	CAP, .033UF,1000V,RAD,POLYPRO, .400",10%
62.3002.0102	1 EA	C14	CAP,.001UF,15KV,RAD,CERAMIC DISC
68.4515.0006	1 EA	L1	COIL,IGNITOR,VL6
75.7102.0001	1 EA	SG1	SPARK GAP, 2.5KV
82.4311.0818	12 EA	D1-12	DIODE, RECTIFIER, MR818 1KV 1A
82.5310.6304	2 EA	Z1, 2	DIODE, Z CLIPPER, 1.5KE180CA 180V 5W

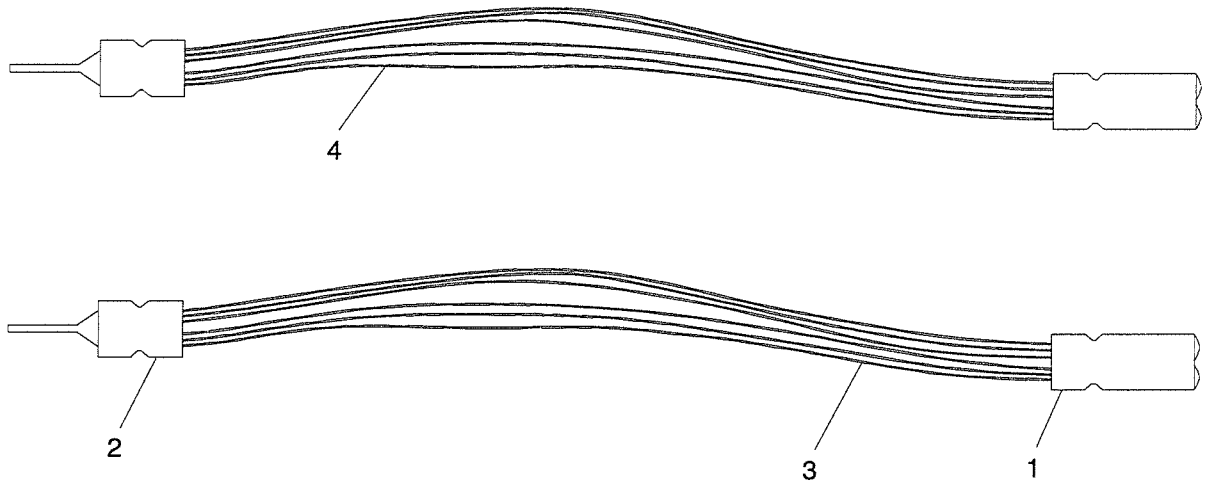
Note: Early version of this ignitor PCB contain a relay at C14. New versions of the **VL5Arc** luminaire have the relay mounted on the yoke leg.



4.2.30 Cable Assy, *VL5Arc* Ignitor (*VL5Arc* Only) 25.9647.0048

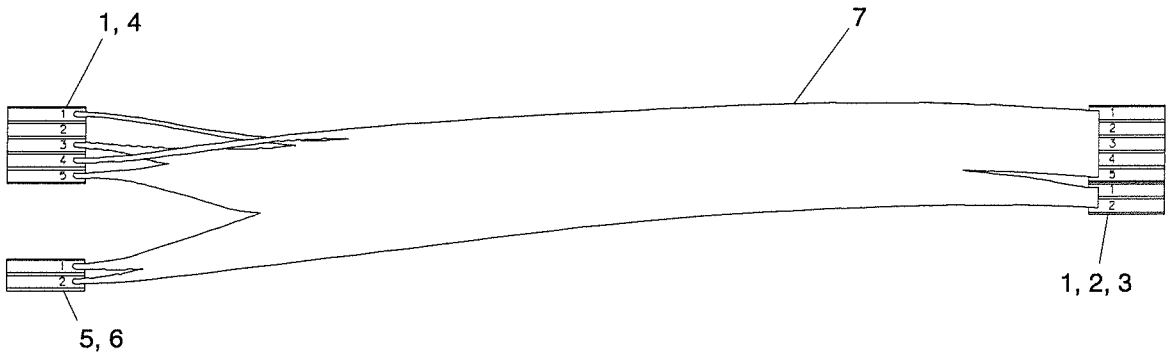
NO.	PART NO.	QTY	DESCRIPTION
1	52.8271.0005	2 EA	RECPT. FAST-ON, 1/4" 16-14AWG INSUL.
2	52.8298.0002	2 EA	TERM, WIRE PIN 16-14 ga.
3	73.7089.0000	4.5 FT (6 x 9 IN)	WIRE, 22AWG BLK 300V TEFLON STRANDED
4	73.7089.0009	4.5 FT (6 x 9 IN)	WIRE, 22AWG WHT TEFLON STRANDED

* - New **VL5Arc** luminaire versions contain a new relay mounted on the yoke leg. The new relay replaces the 2 position terminal block that interconnected these lamp power cables. Lamp power cables will now connect to the relay instead of the terminal block, using Fast-on connectors instead of the wire pins.



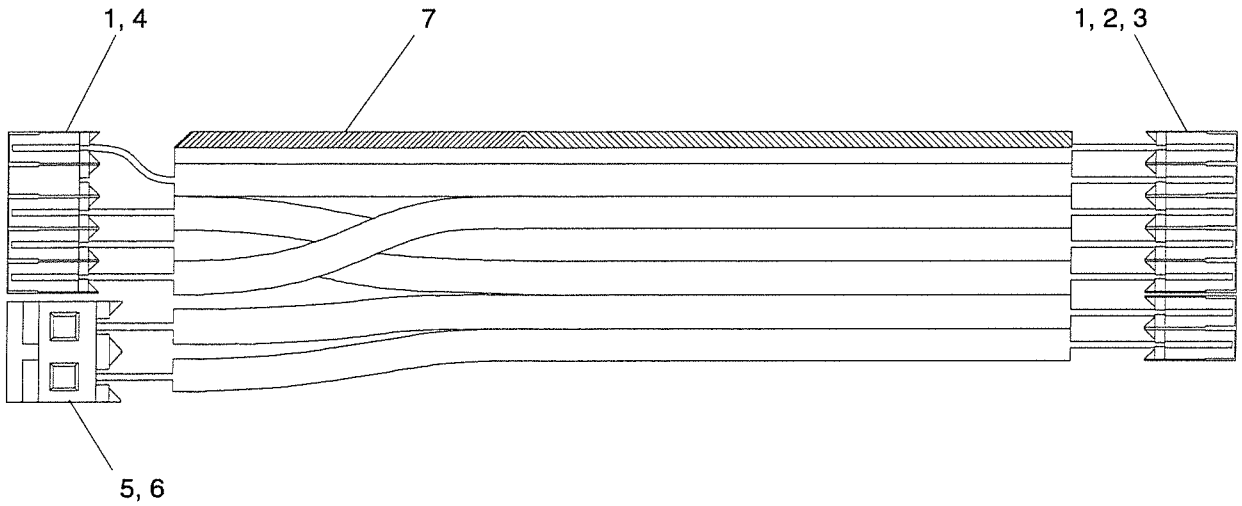
4.2.31 Cable Assy, *VL5* Pan 25.9634.0117

NO.	PART NO.	QTY	DESCRIPTION
1	52.6270.0001	2 EA	CONN HOUSING, MTA CLOSED END RED 5PIN
2	52.6396.0003	1 EA	COVER, STRAIN RELIEF/7POS MTA
3	52.6396.2202	1 EA	RECEPT.MTA100 W/TAB RED 2 POS.
4	52.6424.0005	1 EA	COVER, STRAIN RELIEF/5POS MTA
5	52.6434.2202	1 EA	RECEPT, MTA156 RED 2POS.
6	52.6436.0002	1 EA	COVER, STRAIN RELIEF/2POS MTA156
7	73.7090.0007	8 IN	CBL, RIB .100 CL, 22AWG 7 CKT



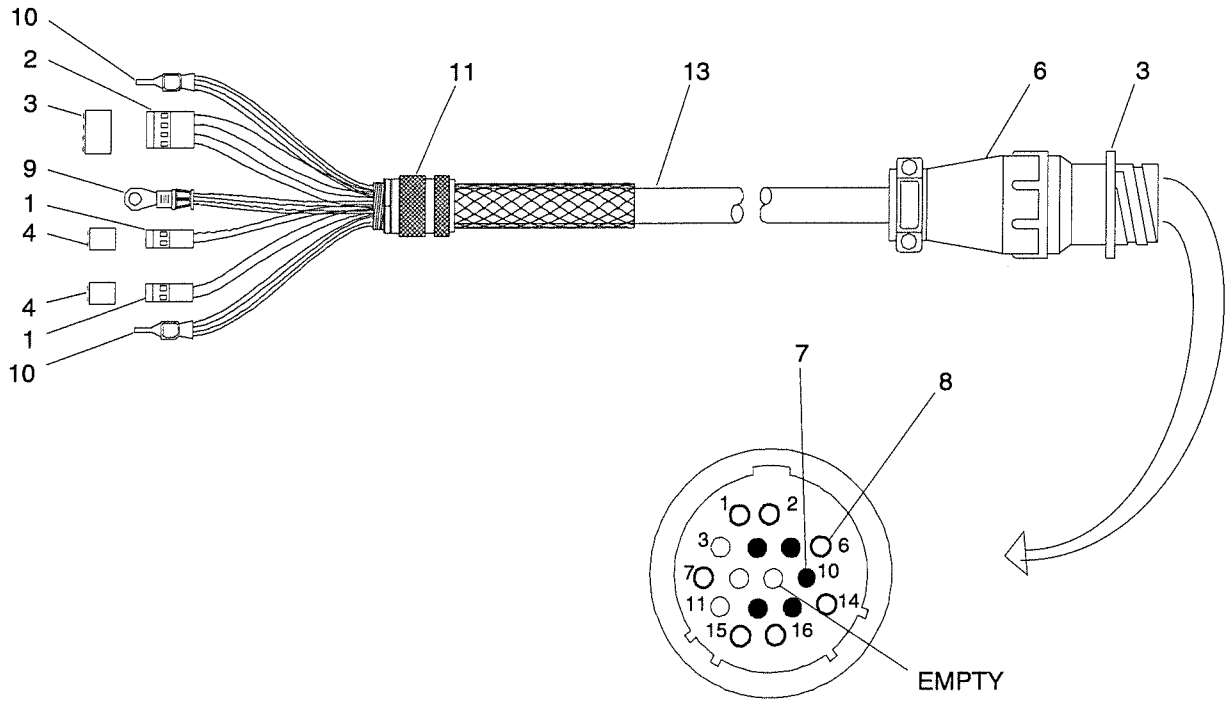
4.2.32 Cable Assy, *VL5* Tilt 25.9634.0116

NO.	PART NO.	QTY	DESCRIPTION
1	52.6270.0001	2 EA	CONN HOUSING, MTA CLOSED END RED 5PIN
2	52.6396.0003	1 EA	COVER, STRAIN RELIEF/7POS MTA
3	52.6396.2202	1 EA	RECEPT.MTA100 W/TAB RED 2 POS.
4	52.6424.0005	1 EA	COVER, STRAIN RELIEF/5POS MTA
5	52.6434.2202	1 EA	RECEPT, MTA156 RED 2POS.
6	52.6436.0002	1 EA	COVER, STRAIN RELIEF/2POS MTA156
7	73.7090.0007	26 IN	CBL, RIB .100 CL, 22AWG 7 CKT



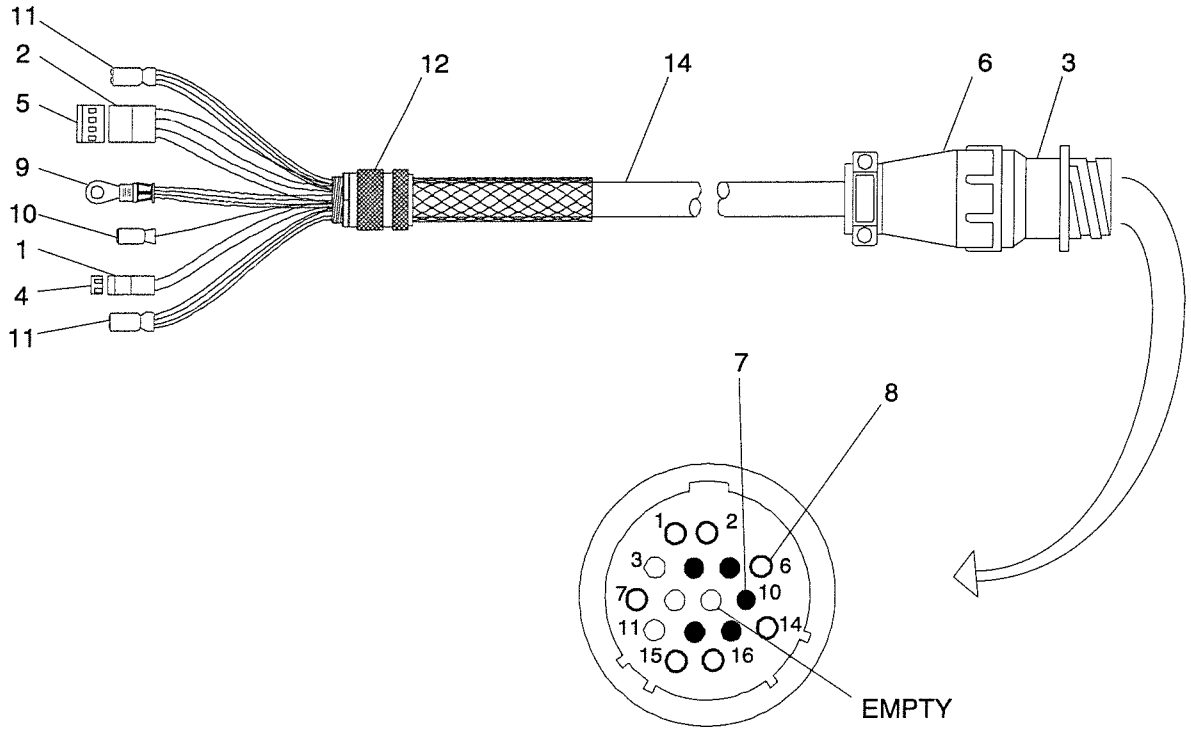
4.2.33 Cable Assy, *VL5* Input (*VL5/VL5B* Only) 25.9634.0180

NO.	PART NO.	QTY	DESCRIPTION
1	52.6396.2202	2 EA	RECEPT.MTA100 W/TAB RED 2 POS.
2	52.6396.2204	1 EA	RECEPT.MTA100 W/TAB RED 4 POS.
3	52.6400.0015	1 EA	RECEPT, CPC 17-16, FREE HANG
4	52.6424.0002	2 EA	COVER, STRAIN RELIEF/2POS MTA
5	52.6424.0004	1 EA	COVER, STRAIN RELIEF/4POS MTA
6	52.6431.0002	1 EA	BACKSHELL, CPC17 NYLON .300-.525 CBL RNG
7	52.8231.0005	1 EA	TERM, RING #6 BLUE 16-14 AWG LOOSE PIDG
8	52.8276.0001	7 EA	CONTACT PIN, TIN 18-16AWG (LOOSE) TYPE 3+
9	52.8277.0001	5 EA	CONTACT PIN, 22AWG GLD (LOOSE) TYPE 3+
10	52.8298.0002	2 EA	TERM, WIRE PIN 16-14 GA.
11	54.1223.0001	1 EA	CORD GRIP,1/2"NPT,610GRIP KELLUMS D-LUX
12	55.2199.0002	3 IN	HEATSHRINK, 1/16" CLEAR (HIDDEN)
13	73.7087.0002	3 FT	CABLE, INTEGRAL VL5 W/GRN-YEL



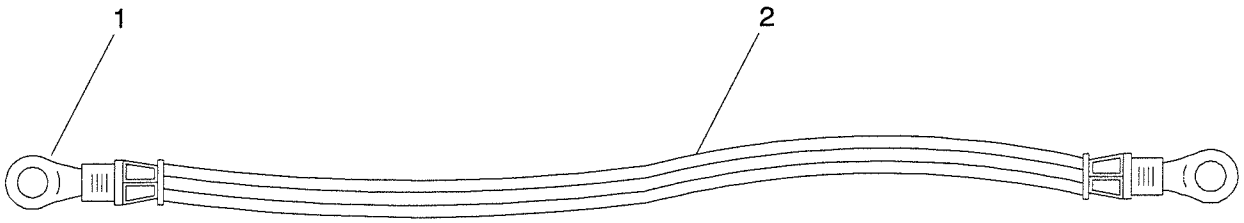
4.2.34 Cable Assy, *VL5Arc* Input (*VL5Arc* Only) 25.9647.0128

NO.	PART NO.	QTY	DESCRIPTION
1	52.6396.2202	2 EA	RECEPT.MTA100 W/TAB RED 2 POS.
2	52.6396.2204	1 EA	RECEPT.MTA100 W/TAB RED 4 POS.
3	52.6400.0015	1 EA	RECEPT, CPC 17-16, FREE HANG
4	52.6424.0002	2 EA	COVER, STRAIN RELIEF/2POS MTA
5	52.6424.0004	1 EA	COVER, STRAIN RELIEF/4POS MTA
6	52.6431.0002	1 EA	BACKSHELL, CPC17 NYLON .300-.525 CBL RNG
7	52.8277.0001	5 EA	CONTACT PIN, 22AWG GOLD TYPE 3+
8	52.8276.0001	7 EA	CONTACT PIN, TIN 18-16AWG TYPE 3+
9	52.8231.0005	1 EA	TERM, RING #6 BLUE 16-14 AWG LOOSE PIDG
10	52.8244.0005	1 EA	FASTON RECEPT, INSUL, .250", 22-18AWG
11	52.8312.0001	2 EA	RECP, FASTON 1/4" 18-14 AWG INSULATED VO
12	54.1223.0001	1 EA	CORD GRIP,1/2"NPT,610GRIP KELLUMS D-LUX
13	55.2199.0002	3 IN	HEATSHRINK, 1/16" CLEAR (HIDDEN)
14	73.7087.0002	3 FT	CABLE, INTEGRAL VL5 W/GRN-YEL



4.2.35 Cable Assy, *VL5* Ground Safety 25.9634.0140

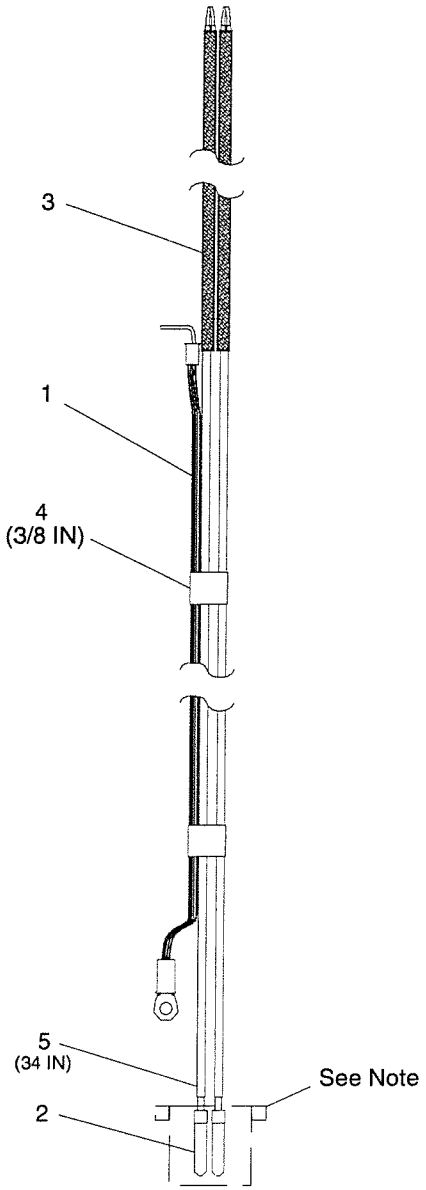
NO.	PART NO.	QTY	DESCRIPTION
1	52.8223.0001	2 EA	TERM, RING #6 BLUE 16-14 AWG LOOSE PIDG
2	73.7089.0504	8 FT	WIRE, 22AWG 300V 200C TEF GRN/YEL UL1180



4.2.36 Cable Assy, *VL5Arc* Bulb Wire (*VL5Arc* Only) 25.9647.0059

NO.	PART NO.	QTY	DESCRIPTION
1	25.9634.0140	1 EA	CABLE ASSY, VL5 GROUND SAFETY
2	52.8247.0002	2 EA	CRIMP CONTACT, S30 TIN
3	55.2260.0208	23 IN	SLEEVING, FIBERGLASS, 0.208" ID
4	55.6695.0002	3.62 IN	HEAT SHRINK, 3/8" ADHESIVE WALL
5	73.7100.0001	68 IN	WIRE, 16AWG 20KVDC 41/32 STRD 200C SILICONE

Note: Series 30 connector shell (52.6264.0003) is located in top assembly bill of material (22.9647.0004) at the beginning of this section.



Chapter 5. Schematic Diagrams

This chapter contains the following sections:

5.1 Connector List
5.2 Schematic Diagrams

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5.1 Connector List

The following section contains pinouts for all **VL5/VL5Arc/VL5B** luminaire cable connectors.

5.1.1 Pan Cable Assembly

2-Pos red MTA100 Recept (From LCB, mates with P7A)*

Pin	Wire	Wire Size	Description
1	white	22 AWG	MTR +
2	blue	22 AWG	MTR -

5-Pos Natural MTA100 Recept (From LCB, mates with P7B)*

Pin	Wire	Wire Size	Description
1	red	24 AWG	+ 5V
2	yellow	24 AWG	ENC A
3	black	24 AWG	ENC B
4	green	24 AWG	GND
5	drain	22 AWG	SHIELD

2-Pos red MTA156 Recept (To Motor Power Cable Assy)

Pin	Wire	Wire Size	Description
1	white	22 AWG	MTR +
2	blue	22 AWG	MTR -

5-Pos natural MTA100 Recept (To Encoder)

Pin	Wire	Wire Size	Description
1	green	24 AWG	GND
2	N/C		
3	yellow	24 AWG	ENC A
4	red	24 AWG	+ 5V
5	black	24 AWG	ENC B

* 2-Pos red MTA100 and 5-Pos natural MTA100 receptacles are fitted together with a 7-pos MTA100 strain relief cover.

5.1.2 Tilt Cable Assembly

2-Pos red MTA100 Recept (From LCB, mates with P8A)*

Pin	Wire	Wire Size	Description
1	white	22 AWG	MTR +
2	blue	22 AWG	MTR -

5-Pos Natural MTA100 Recept (From LCB, mates with P8B)*

Pin	Wire	Wire Size	Description
1	red	24 AWG	+ 5V
2	yellow	24 AWG	ENC A
3	black	24 AWG	ENC B
4	green	24 AWG	GND
5	drain	22 AWG	SHIELD

2-Pos red MTA156 Recept (To Motor Power Cable Assy)

Pin	Wire	Wire Size	Description
1	white	22 AWG	MTR +
2	blue	22 AWG	MTR -

5-Pos natural MTA100 Recept (To Encoder)

Pin	Wire	Wire Size	Description
1	green	24 AWG	GND
2	N/C		
3	yellow	24 AWG	ENC A
4	red	24 AWG	+ 5V
5	black	24 AWG	ENC B

* 2-Pos red MTA100 and 5-Pos natural MTA100 receptacles are fitted together with a 7-pos MTA100 strain relief cover.

5.1.3 PTM Motor Power Cable Assembly

2-Pos red MTA156 Connector (To Pan/Tilt Cable Assy)

Pin	Wire	Wire Size	Description
1	white	22 AWG	MTR +
2	blue	22 AWG	MTR -

5.1.4 Blue Filter Set Motor

4-Pos green MTA100 Recept (From LCB, mates with P1)

Pin	Wire	Wire Size	Description
1	red	28 AWG	COIL A +
2	black	28 AWG	COIL A -
3	blue	28 AWG	COIL B +
4	green	28 AWG	COIL B -

5.1.5 Amber Filter Set Motor

4-Pos green MTA100 Recept (From LCB, mates with P2)

Pin	Wire	Wire Size	Description
1	red	28 AWG	COIL A +
2	black	28 AWG	COIL A -
3	blue	28 AWG	COIL B +
4	green	28 AWG	COIL B -

5.1.6 Magenta Filter Set Motor

4-Pos green MTA100 Recept (From LCB, mates with P4)

Pin	Wire	Wire Size	Description
1	red	28 AWG	COIL A +
2	black	28 AWG	COIL A -
3	blue	28 AWG	COIL B +
4	green	28 AWG	COIL B -

5.1.7 Diffuser Panel Set Motor

4-Pos green MTA100 Recept (From LCB, mates with P5)

Pin	Wire	Wire Size	Description
1	red	28 AWG	COIL A +
2	black	28 AWG	COIL A -
3	blue	28 AWG	COIL B +
4	green	28 AWG	COIL B -

5.1.8 Input Cable Assembly

2-Pos red MTA100 Recept (Power to LCB, mates with P10A)

Pin	Wire	Wire Size	Description
1	red	22 AWG	+ 24V
2	green	22 AWG	GND

2-Pos red MTA100 Recept (Power to LCB, mates with P10B)

Pin	Wire	Wire Size	Description
1	red	22 AWG	+ 24V
2	green	22 AWG	GND

4-Pos red MTA100 Recept (Luminaire Comm to LCB, mates with P9)

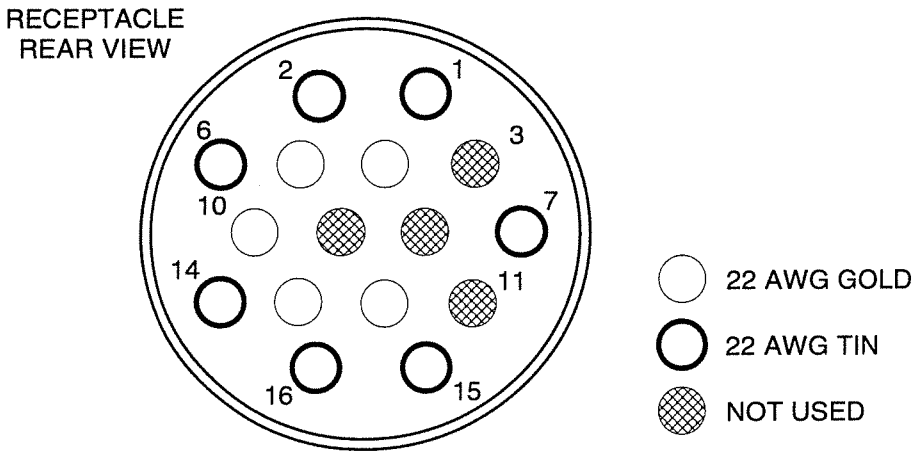
Pin	*New* Wire	*Old* Wire*	Wire Size	Description
1	yellow	red	22 AWG	Tx +
2	blue	black	22 AWG	Tx -
3	orange	white	22 AWG	Rx +
4	gray	green	22 AWG	Rx -

* Old pin-wire codes were used in first 300 batch of **VL5** luminaires only.

AMP 17-16 CPC Recept (Luminaire Input)

Pin	*New* Wire	*Old* Wire*	Wire Size	Description
1	Black	Black	22 AWG x3	DIMMER LINE 1
2	Black	Black	22 AWG x3	DIMMER LINE 2
3	N/C	N/C		
4	yellow	red	22 AWG	Tx +
5	blue	black	22 AWG	Tx -
6	green	green	22 AWG x3	DIMMER GND 1
7	red	red	22 AWG	+ 24V
8	N/C	N/C		
9	N/C	N/C		
10	drain	drain	22 AWG	SHIELD
11	N/C	N/C		
12	orange	white	22 AWG	Rx +
13	gray	green	22 AWG	Rx -
14	green	green	22 AWG x3	DIMMER GND 2
15	white	white	22 AWG x3	DIMMER NEUT 1
16	white	white	22 AWG x3	DIMMER NEUT 2

* Old pin-wire codes were used in first 300 batch of **VL5** luminaires only.



5.2 Schematic Diagrams